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# The Farmer's Digest

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# The Farmer's Digest

Volume 13 November, 1949 Number 7

## Dividends from Good Farm Practices

Condensed from Ohio Farmer

IN ITS early days the agricultural extension service set up demonstrations to show improved practices. Each county in Ohio now has demonstrations of several kinds running in cooperation with farmers.

A group of farms in Holmes County were started on a long-time agronomy and farm management demonstration in 1939. These farms were also the testing ground for new, high analysis fertilizers being produced by the Tennessee Valley Authority. In exchange for following the improved practices recommended by the TVA and the extension service, these farmers were able to save money in fertilizer costs. This was in addition to the increased profits to be expected from following the improved practices. The county agent gave his time in laying out contour strips and farm ponds in the interest of the new demonstration.

The TVA officials wanted to know if a fertilizer containing 62 per cent available phosphorus would harm crops. On these farms they found that equally good results were obtained when equal amounts of plant food were applied, regardless of concentration per 100-pound bag.

Also extension service and TVA folks wanted to know what could be expected over a long period of time from a well balanced farming program. Farmers who signed up for this demonstration had agreed to follow improved practices, conduct test plots and keep accurate records. Ten years have passed since the program started and the results can be seen on any one of the farms. Let's look at the Irvin L. Cunningham farm.

It's a rolling hill-land farm at the northern edge of the county. Irvin has been a livestock farmer from the start. He first arrived on this farm as a hired hand in 1913. In 1916 he took over an active interest in the operation of the

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farm. When the TVA demonstration was started in 1939 he was grazing 14 milk cows on 20 acres of permanent pasture. And it was "slim pickings" in the hot summer months as well as early spring and late fall. He had to rent pasture away from home for the young stock. He also kept five brood sows but they were confined to a bare lot. In 1939 he was keeping around 175 laying hens.

Irvin is a firm believer in improved bluegrass pastures. Under the TVA program he added 1½ tons of lime to the acre and put on the equivalent of 500 pounds of 20 per cent super-phosphate in the concentrated TVA fertilizer. Another 500 pounds was added at the end of five years. Lime is added according to needs shown by soil tests. He gives the entire pasture a light coating of manure each year. All of the pasture is clipped regularly to keep it coming.

Let's look at the stock Irvin runs on the home farm now. He doesn't need to rent any pasture. From early spring to late fall he pastures 26 milk cows and 17 Holstein heifers. He doubled the number of brood sows to 10. This year he raised 70 feeder pigs on pasture. He has 500 White Leghorn layers and raises the replacement pullets each year right out in that 20-acre pasture. He clipped the pasture the third week in June this year and made 164 bales of nice hay from it. He does have an extra six acres of alfalfa for the hogs. This saves money on protein feed.

The Cunninghams used to have to buy hay. Now they raise all they need. By following all recommended practices the yields have been raised on all crops. Wheat yields have increased eight bushels to the acre. Hay yields run up to a ton higher per acre. All crops and livestock have benefited by the program.

Another Holmes County farmer who has followed the TVA farming program is A. W. Schonauer. The Schonauers operate a steep hill-side farm in Killbuck township. Mr. Schonauer is past 80 years of age and has turned the operation of the farm over to his sons. He has watched his farm change completely in appearance and productive ability by the use of modern soil conservation and farm management practices. He says, "This farm has been in my family as long as I can remember. Our crop yields are away ahead of 40 years ago and we're keeping a lot more stock. Even with the extra stock we don't have to buy hay. I tell you this contour strip cropping is the only way to farm these hills. It's too bad I didn't know about this way of farming when I was a young man."

These are the experiences of two of the farmers who started to

improve their farming programs in 1939. S. M. MacIntosh, Holmes County agent, has made a detailed study of 13 farms which have been under this special program for the last 10 years. Each farm has kept complete farm account records. This makes an analysis of the farm improvement possible.

The 10-year period covered by the study includes 1939 to 1948. The farms analyzed are typical for the area. They have the usual farm enterprises but were better than average farms in both production and income at the start of the project. We will call the years 1939 to 1943, inclusive, Period 1, and the years 1944 to 1948, inclusive, Period 2. The 13 farms had an average cash income of 113 per cent above the average for the county during Period 1. Even so, during the last period the cash income on these farms had risen to 149 per cent above the county's average. During the same period labor incomes on these farms more than doubled. These progressive farmers were getting twice as much for every hour of work they performed at the end of the test period as they received during the first five years.

The pay-off on a sound soil management and crop program shows up in corn yields which are 20 per cent above the county averages. Wheat yields are 11 per cent above the county average and hay yields 31 per cent above average.

The permanent pastures on the 13 farms have all had careful soil tests in all areas. They have been limed and fertilized on the basis of the soil tests. This is a big factor in permitting an increased livestock program on the farms. The largest livestock increases have been in dairy cattle and poultry. The number of dairy cows has increased 27 per cent and the number of laying hens has increased 31 per cent during Period 2, over the numbers kept during the first five years. Brood sows and sheep numbers are also up.

But there is more to this than the numbers of livestock kept. The quality and productivity of the livestock has been improved. Butterfat production has increased from 260 pounds per cow per year to 300 pounds per cow per year in Period 2. Egg sales have increased far more than the number of hens kept. This increase amounts to 28 per cent more eggs per hen.

Increases in production of livestock and crops do not tell all of the story either. There has been a great reduction in the amount of grain and concentrates fed. The higher rate of production was obtained on 11½ per cent less grain and concentrates than were fed formerly. These farmers have been going from a grain economy to a grass economy. There was an increase of 20 per cent in the

amount of hay fed and an increase of 14 per cent in the amount of silage fed.

This practical, down-to-earth farm program demonstrates that there are real dividends when the right practices are combined. These demonstration farms stand out as fine examples in their individual communities. Common sense soil conservation measures applied to the land along with a well balanced fertility program make it possible to keep more and better livestock on less acreage. At the same time high productivity can be restored to the soil.

## A New Method of Storing Crops

Condensed from Capper's Farmer

*M. N. Beeler*

Can you imagine a building that will store silage, hay or grain—one that loads from the top and unloads from the bottom? Did you ever see a structure, glass coated inside and out, that can be sealed up like a fruit jar to prevent spoilage?

Such a unit was put on the market this season after 4 years of testing. It was designed by the A. O. Smith Corporation as a better silo. But farmers have kept half-cured hay and high moisture shelled corn in it for several months without spoilage.

Agricultural engineers and biochemists are wagging their heads about the development. They wonder if it means the whole picture of farm storage is due for a radical change.

Unusual features of the new unit, which is called a Harvestore, are: The glass coating and plastic joint sealing which make it airtight; absence of ordinary silo doors; a plastic breather bag at the top which equalizes pressure within the structure; the bottom unloader.

The first unit was built on Swiss Town Farm, Rock county, Wisconsin. Tests there since 1945 and on 4 other farms in Wisconsin and Illinois since 1946 have proved it as a silo. Additional experimenting with grain and hay storage is under way on Swiss Town Farm, and on several other farms.

Reprinted by permission from Capper's Farmer
Topeka, Kansas, September, 1949

Here's how the unit works: Feed is blown in thru 1 of 2 roof portholes. The other hole permits air to escape as filling proceeds. When loading is finished, or between runs, the portholes are sealed. After the crop is stored, it continues "breathing," which means giving off carbon dioxide and using up oxygen. The organisms which cause spoilage must have oxygen. They have none to work on since the crop replaces it with carbon dioxide and so the feed is preserved. Not enough air gets in at the unloader during its brief daily operation to cause any trouble. Other times it is sealed.

One big advantage of the unit when it is used as a silo is low spoilage. The rule about removing at least a 3-inch layer daily in summer feeding doesn't apply. Remember the feed is taken off the bottom. The top is undisturbed.

Curtis C. Weaver, farm manager at Swiss Town, said he could have put all the spoiled silage from 3 silos in a bushel basket. And that included feeding during July, August and September when pastures were short.

In June, 1948, Weaver put 15 tons of chopped, partly cured hay in one of the structures. Moisture content of the crop was 40 percent at time of storage. It remained without spoilage until September when corn silage was put on top. Shortly afterward he began feeding the hay and it had about the same moisture content as when it went in. Later, drainage of juices from the corn above started some fermentation in the hay, but it didn't go over to silage.

Last spring 25 tons of 40-percent-moisture hay were put into the first unit built at Swiss Town. The University of Wisconsin took samples for carotene determination. Samples of hay from the unit will be examined as feeding proceeds to determine loss of carotene.

Wisconsin scientists have learned that feed with 8 to 15 percent moisture sealed in airtight plastic tubes retains its carotene. They are now trying to develop a plastic-lined bag for storage of alfalfa leaf meal and other high carotene feeds. Will the new structure preserve more carotene than ordinary storage? The answer may be forthcoming when tests are complete.

At harvest time in 1947, F. H. Van Epps, Boone county, Illinois, put 800 bushels of shelled corn in a specially built Smith unit of 1,000 bushels capacity. The corn was shelled from the field and contained 23.5 percent moisture. That is 10 percent above the safe level. The corn remained sealed for nearly a year and came out of storage with 23.5 moisture. None spoiled.

In November, 1948, Van Epps

put 3,000 bushels of corn in a regular size structure. About two thirds of the 14-by 40-foot space was filled. The corn contained 23 to 33 percent moisture when it was stored. It was fed out during spring and the unit was filled with grass silage. A sample of the shelled corn was removed April 18 and sealed in a screw-top jar. On June 24 the grain was still as bright as the day it was harvested. There was no mold or discoloration visible thru the glass. Van Epps has 2 of the standard structures on another farm.

What happens inside this airtight storage to keep moist hay and moist grain from spoiling? Nobody knows. But replacement of oxygen by carbon dioxide may be responsible. Some years ago Prof. Oscar Erf, Ohio dairy scientist, got the notion of preserving green soybean forage in a silo with dry ice. His main trouble was lack of airtight sealing.

Now if storing grains of high moisture content proves widely feasible, what will this new equipment mean to grain sorghum growers? It could lead to development of a livestock feeding industry in the Plains Country. Also what possibilities does the airtight bin offer in farm storage of soybeans to permit growers to profit by after-harvest price rises? We may know the answers before long.

## USDA Crossbred Cattle Better than Purebreds

**Crossbred cattle are still doing better than the straight purebreds at the U. S. Range Livestock Experiment Station in Montana.**

**At 18 months of age, Hereford heifers are averaging 696 pounds. Hereford-Shorthorn crosses weigh 768 pounds, and Hereford-Shorthorn-Angus crosses, 776 pounds.**

**At 2½ years the weights are 948, 1166, and 1034 pounds. Weights at 4½ years are 1056, 1234, and 1049 pounds.**

**The crossbred females make excellent mothers on the range, and give lots of milk, say USDA range specialists.**

*—Farm Journal*

# More Profits from Dairy Cows

Condensed from the Farm Journal

*Claude W. Gifford*

NO OTHER livestock can make food for the table quite as cheaply as dairy cows.

Hogs make food with less feed. But more than 90% of what they eat is expensive concentrates. Threefourths of a cow's diet is cheap roughage, like pasture—which is the cheapest feed in the world. Hay and silage are next cheapest.

If we run into a stretch of crop surpluses (or a government program of fewer crop acres), it might be smart—or necessary—to grow more hay and pasture. And dairy cows are just the kind of milk-giving mowing machines that can turn that land into ready cash.

Good legume pasture is the cheapest feed there is. On the other hand, "fair weather" pasture that's late to start in the spring, quick to dry up in summer, and early to stop growing in the fall, can be the most expensive feed you can use.

Having good pastures over a long season is your real secret to big dairy profits. Dairymen with good pastures get nearly threefourths of all their dairy feed from pasture and roughage. This way, they make milk for about fifty cents a hundred cheaper than other dairymen who have only fair pastures that furnish only half of the total feed.

It's just as costly to be stingy with a good cow as it is to overfeed a poor one. And even the experts can't look at a cow and tell you how much feed she ought to have. You need a feed chart.

Before you look at the chart, let's see why the feed experts say it's a good idea to use one: A cow uses part of her feed to keep up her body. She turns the rest into milk. But if she gets more feed than she can make into milk, she turns it into fat—and cow fat is expensive to make.

Every cow inherits just so much milk-making ability from her parents. You can't change it. So the real secret is to feed right up to her milk-giving ability, but no more.

## How You Can Use Chart

The figures in the center of the chart (adapted from USDA figures) tell us how many pounds of grain a day to feed cows testing

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Philadelphia, Penna. September, 1949

from 3% to 6% butterfat, and giving from 15 to 40 pounds of milk a day—while getting *all* the *good* roughage (hay, or hay and silage) they can eat.

For every 100 lbs. less than a thousand a cow weighs, *add* ¾ lb. of feed to the chart figures. For every 100 lbs. more than 1,000, *subtract* ¾ lb. Bigger cows eat more roughage, need less grain.

When you're feeding all the *poor* roughage the cows will eat, add 2 lbs. to each of the grain figures. If your cows are getting only normal feedings of good or poor roughage (say 15 lbs. of hay a day for a 1,000 lb. cow) *add* 3½ lbs. of grain to the chart.

When your cows are on *excellent* legume-grass pasture, subtract 5½ lbs. from each of the grain figures, *regardless of the cow's weight.* (For example, a 5.0-test cow giving 30 lbs. of milk will need only 3 lbs. of grain.) If cows are on only *fair* pasture (and even the best spring pasture can become *fair* during hot months), *add* ¾ lb. of grain to the chart, except when hay or silage are fed while cows are on pasture; then *subtract* ½ lb. of grain from the chart for each pound of hay fed, and ¼ lb. of grain for each pound of silage.

When cows get *all* the good quality winter roughage or pasture they can eat—and grain according to these recommendations—they will get enough protein. When they get only *fair* quality roughage or pasture, *add* 20 lbs. of a good protein supplement (such as linseed or soybean meal) to every 80 lbs. of grain. If they have only *poor* pasture or roughage—or roughage made up mostly of grasses or corn silage—*add* 35 lbs. of the protein supplement to every 65 lbs. of grain; then feed the mixture according to the chart.

*Here are some other tips on cutting feed costs.*

Keep cows away from acorns, hedge balls, persimmons, and seeds of sweet sorghums. Cows that eat them will drop off in milk rapidly; and it will take a lot of expensive feeding to get them back. (It's always hard to get a cow's milk production back once it has fallen off for any reason.)

When you put cows on grass in the spring, give the usual feed of roughage and grain for the first few days, then taper off according to the milk each gives.

Give cows plenty of water; they'll eat more hay and make more milk on cheaper feeds. Sounds obvious but it's surprising how many cows don't get water enough. A cow milking 40 pounds must drink more than 20 gallons of water a day. It's hard for her to take on that much in only a couple of trips to the tank, especially if the water's cold.

Put up grass silage or cure your

hay in the barn when you can. Field-cured hay loses up to a quarter of its most valuable leaves and nearly a third of its protein, even when the haying is done during good weather. The protein in hay is a lot cheaper than any you can buy. *There's enough protein lost each season from 10 acres of field-cured hay to feed 8 average cows all the protein they need for a year.*

When grain prices are low, feed a little more grain than ordinary.

When you buy proteins, look on the sack or tag and compare the *actual protein* in different feeds with the cost.

Grind or crush grains for cows, and for heifers more than 6 months old. They'll get more out of the feed.

Watch a cow's flesh shortly after calving. If she begins to lose weight and drops off in milk at the same time, feed her more grain. She's using up her reserves too fast.

Feed simple grain mixtures. They'll do as much as complex ones.

Feed cows all the good legume hay they can eat if you've got it. That's the cheapest way to make milk. Cows will eat more good hay than poor hay, and will need less grain. Use self-feeders for hay whenever this is possible.

Don't turn cows out on permanent pasture too early in the spring. The grass is too full of water when it's short; and it needs to store up nutrients in its roots to carry it through.

Even in normal times about one cow out of four is a "stanchion sally" who doesn't pay for her feed.

Most of us don't know which cows are loafing on the job. But the dairy farmers who are making the most money track them down with scales and a pencil. It's surprising what they learn with a butterfat test, and a few days of weighing the milk and feed. The figures throw a spotlight on the cows to cull, the ones to feed more, and the cows whose calves are most likely to do the best.

For example, one dairyman in Whiteside County, Ill., who was feeding his cows by shaking grain out of a basket ("about as much as I figured each one should get") saved $156 in feed in one month when he began feeding according to the milk each cow gave.

If you join a Dairy Herd Improvement Association, a tester will come around one day each month, take a butterfat test, and weigh the milk and the feed. He'll keep the records and figure out the feed costs and the profits. But if you don't have enough cows to pay to belong to the DHIA, you can weigh the milk every day, or one day a week, and get a butterfat test made every month. Your creamery or dairy will usually make a test for you.

Forty years ago, dairymen in Rice County, Minn., spent 144 hours a cow per year in chore time. A recent check in Nicollet County in the same state shows dairymen there *still* putting in 142 hours per cow. One farmer in this county gets by with only 90 man-hours per cow, while another dairyman with the same number of cows (21) puts in 193.

How can you shorten *your* chore time? Faster milking is a good place to start, for more than half of the average farmer's dairy chore time is milking.

A cow can be taught to milk fast or slow—but once she gets used to something she's stubborn.

This is what dairymen do who use the faster milking system:

(1) About a minute before they put on the milking machine—or start hand milking—they wipe and massage the udder and teats for about 30 seconds with warm water.

(2) Then they milk out two or three squirts of milk from each quarter. (They do this in a strip cup so they can see any bloody or stringy milk—a sign of mastitis.) This fore-milking and massaging sends a message to the little pockets in the udder telling them to let go of their milk.

(3) Next they get the teat cups on in a hurry. Most cows learn to milk out in three or four minutes, but the timing needs to be accurate or she'll never learn it. Some men have better luck using a timer than by trusting their judgment.

(4) Finally they strip by machine. As soon as the timed period is up, they pull down the teat cups with one hand (to keep them from crawling up on the teats) and massage the udder with the other hand. Cows can be milked just as dry this way as by hand.

Another good time-saving trick is to make a cart for the milking machine, washing solutions, dairy scale, and records. This can be pulled along behind the cow, and it keeps the work in one spot.

*You can use a fast-milking plan for hand milking, too. The thing to do is to get the cow started on the right habits. The real secret is in getting the massage working that causes a cow to let down her milk in a hurry—then milk in a hurry and quit; don't strip for a couple of minutes. If you do strip, the cow will get used to it, and you'll have to keep it up.*

Cleaning the barn and feeding comes second in chore time. Many farmers have whittled the cleaning job in half with barn cleaners, manure carts behind the cows; manure carriers on tracks; and pen-type barns.

Here are other things that will speed up the chores: silage and feed carts, overhead bins for feed storage, elevators and feed blowers, milking parlors, silage unloaders, and self-feeding hay arrangements.

A milk house gets the cleaning and milk handling job under one roof where everything is handy and easy to get at.

Some dairymen get by with once-a-day feeding, and say that it works all right.

Some dairymen who find hand milking quite a chore, add enough cows to their herd to make it pay to use a milking machine. They can milk faster and easier; the extra cows soon pay for it.

Automatic drinking cups save time and make milk. Cows will drink a big part of their day's water supply in the early evening if they can get at it. If they can't they don't make as much milk. Water's cheap, and milk is mostly water.

The quickest and cheapest way to get good cows is to breed your cows to a good bull and raise the calves. And the easiest and cheapest way to do that is to use artificial insemination.

Most dairymen find that they can take the feed a bull would eat, put an extra cow in the barn space he would take, and get enough milk to pay for breeding their cows to really good bulls.

*Take semen from the best bull available, regardless of his breed, say USDA specialists (unless you have purebreds, or want uniform color more than top production).*

A year ago, the DHIA records showed that a cow with 200 pounds fat (the national average) made $111 above feed costs. One with 400 pounds fat made $279 above feed costs—even though it cost $41 more for feed.

At this rate, if you have ten 200-pound cows, you'll get $1,110 for a year's work. But with only four 400-pound cows you'll make $1,116—and with less than half the work.

You might ask, why raise calves at all? They drink a lot of milk, and about one calf out of five dies before it's six months old—which is quite a loss. Besides, you can often buy heifers for less than the cost of raising them.

The answer it that the dairymen who do raise their own calves know what they're getting; and they can raise them right—to develop all their inherited ability.

One way to cut calf-raising costs is to have your calves come in the fall. There's more free time during the winter for calf-raising and heavy milking; feed for the calf doesn't cost you as much (because calves get two summers of low-cost pasture instead of just one, and heifers are on pasture during the last six months before freshening, which is when they're eating the most); cows give more milk over the year, as they get one boost from freshening and another boost from spring pastures; cows are dry in summer when milk production is likely to drop off any-

way; and the herd milks the heaviest during winter's high milk and butterfat prices.

Here are some tried and proven ways of raising good calves cheaply:

*Calves Up to 2 Weeks of Age.*

See that the calf sucks within an hour. Take it away from the cow in a day or two, and keep it on the mother's milk for another two or three days.

Start milking the mother with the machine right from the start, and feed the extra colostrum milk to other calves (some dilute it at the rate of 2 lbs. of milk per pound of colostrum, others substitute it pound for pound). If you don't have enough calves to drink all the colostrum, refrigerate it and feed it over several feedings —after warming it up to body temperature.

Feed one pound of milk to 10 pounds of body weight. More than this is a waste and is hard on the calf. *More calves are overfed than under-fed.*

Use a nipple pail if possible. Feed small amounts of milk at a feeding. A calf's stomach holds less than two quarts at birth; more than this at one feeding spills over into the second stomach where it upsets the calf's digestion. (This probably happens when calves gulp down their milk, too.) This is the cause of most calf feeding troubles.

*Calves from 2 Weeks to 6 Months (The Calf Starter Way)*

Put fresh legume hay in front of the calf every day. If hay is not good, feed some vitamin A.

Start the calf on a dry, grain starter. (A simple starter can be mixed from home-grown feeds.) Get it started eating by rubbing a little on its nose when it gets through with its milk—or put a handful in the bottom of the calf bucket when it's through (don't mix it with regular feeding of milk).

Feed all the calf starter meal the calf wants (up to four pounds a day) during the first three months. Then start the calf on a growing ration. Feed plenty of fresh, legume hay.

Start cutting down on whole milk the 4th week. Cut 1 lb. the 4th week; 2 lbs. the 5th; 1 lb. the 6th; then gradually wean over the next week or two.

(*The Skim Milk System*)

Feed good legume hay right from the start. If hay is not good, give the calf some vitamin A (such as cod-liver oil or capsules).

At about three weeks of age start substituting skim milk for whole milk. Take about a week to complete the change.

When the calf is two months old it can start drinking cool milk.

Continue the skim milk until the calf is six months old. And

remember that calves need water every day, even when getting a lot of milk.

Calf scours and pneumonia are the main calf killers. The trouble comes from too much milk; irregular feeding; sudden changes in feed; dirty pails and pens; wet, drafty, or crowded pens; and lack of vitamin A.

Keeping healthy cows on the milking line for as long a life as possible keeps costs down—you get the most return from your investment in raising them.

The two worst enemies of cows are mastitis and Bang's disease. In Illinois, for example, one cow out of every five has mastitis. And mastitis spells trouble—such as cows dropping off in milk, high bacteria counts in the milk, blind quarters, fussy cows, and hard milking.

Mastitis is an udder infection that starts with an injury to the udder or teats. The germs are around most of the time, just waiting for a chance to start their dirty work. Here are the best ways to keep them waiting: use faster milking with clean equipment . . . use the strip cup every day . . . milk infected cows last. . . have milk samples from all cows examined occasionally by a veterinarian . . . buy only healthy animals . . . use deep bedding . . . treat udder and teat injuries as soon as you find them . . . keep your cows and barn clean . . . *keep calves from sucking one another* . . .treat only the cows most likely to recover . . . don't let cows stand in muddy barnyards. . . . see that each cow has plenty of stanchion room . . . build ramps over high barn sills . . . let the dog chase the chickens, not the cows . . . when mastitis shows up, call the veterinarian.

Bang's disease can sneak up and grab your dairy profits and it can strike you down, or members of your family, with undulant fever. It's becoming a fairly common farm ailment.

Scientists now think the *best* herd plans for Bang's control is: (1) vaccination; (2) careful buying so as to not bring infection into the herd; (3) keeping healthy cows away from possible infection; and (4) eventually to have Bang's-free herds and Bang's-free areas.

It pays to knock out lice and other pests. Cows will give up to 15% more milk when you keep flies down by cleaning up breeding places and by spraying with methoxychlor or other recommended sprays.

Cows are regular heating stoves, burning up feed as fuel. A dozen Holsteins, each milking 45 pounds a day, give off enough heat in an hour to raise the temperature of a half-ton of water nearly 40 degrees.

For this reason, cows don't need expensive warm barns, but

they do need plenty of ventilation to keep down the moisture in the air. The dozen Holsteins also give off more than 10 pounds of water vapor an hour.

A winter test in North Dakota shows that if cows are fed enough, have shelter from wind, snow, or rain, and have a dry place to bed down, they'll keep healthy and make about as much milk in a cold shed as in a warm barn—even in that climate.

This is a change from what we used to think. So a lot of dairymen who are getting more cows, aren't building a costly layout. Some are extending the end of their present barn. Others are putting up a pen-type barn, which is cheap—but good—housing.

Farmers who have this pen-type set-up say this: they're cheaper to build; take less work; cows keep cleaner and get hurt less often; you get more out of your manure; and you can add cows to your herd without increasing your equipment.

Of course, you do have to use more bedding; you need more building space per cow; and you have to de-horn the herd.

But whether it's a pen-type or stanchion barn, milk house, equipment, or new breeding stock, the same principle counts; invest no no more than the cows can pay for while still paying you a good wage for your work. It's like rent; if it's too high, you've got nothing left when it's paid.

*The dairymen who get all of their costs down—and still do a good job—will keep on making good wages no matter what happens.*

## Orchard Grass—A Weed or a Blessing

Condensed from American Agriculturist

*T. E. Milliman*

THE DAY arrived in the spring of 1947 when we had to decide for or against orchard grass in a pasture mixture for milking cows. There was no trouble about Brome. We liked Brome with its good palatability at all stages of the season, although we didn't like its very slow summer growth. Alfalfa was to be included as a matter of course since we are in an alfalfa district, a limestone area 15 miles southwest of Rochester, New York, but we knew that alfalfa cannot stand close grazing, however good it is

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Ithaca, New York, August 6, 1949

while it lasts. Ladino we wanted, too, knowing it would stay longer than alfalfa, with quicker recovery after grazing. But orchard grass recalled bad memories. We were skeptical.

Some 14 years before, on another field, we had established a 20-acre back pasture for heifers and dry cows in which orchard grass was a prominent feature, along with Kent County wild white clover from England. In spite of having divided the field into two parts so that we might in some years mow and harvest the front half, we always had trouble in keeping the orchard grass under control. In fact, victory never came our way in any year. Sometimes we had as many as two big heifers or dry cows to the acre but it was never enough in the spring. The orchard grass would get ahead of other herbage and itself become unpalatable, while almost completely choking out the white clover and other legumes. It conquered the other grasses with the exception of bluegrass. The bluegrass had the habit of quitting in June and surrendering the whole pasture to the coarse, unappetizing orchard grass upon which cattle would exist but not thrive. Then the bluegrass would amount to nothing until fall. In all the 14 years we had failed to get proper results from orchard grass. Other briefer experiences were sadly recalled.

Early in 1947, Professor E. L. Worthen, Cornell Agronomist, since retired, had advised a mixture of Brome, Ladino, alfalfa and orchard grass—the latter to be seeded liberally to avoid clumping. After his advice was received we went back to him and told our story of defeat by orchard grass. He was adamant. The points he made are these:

1. Orchard grass starts first in the spring, just ahead of the Ladino, and provides the substance for very early grazing, two or three weeks ahead of most pastures. He said that orchard grass when short has good palatability, and pointed out that it required only extra heavy early grazing.

2. If kept down in spring, the growth of orchard grass during the hot dry summers so characteristic of the Monroe County area is greater than that of any other grass yet available to farmers, and the young summer growth is liked by cattle.

On the very last day before seeding this 16 acre field adjoining the cow barn, orchard grass was added, with no enthusiasm. We put 10 lbs. to the acre figuring that if we were going to be whipped again, we might as well make a real job of it. After the oats were cut off, there was considerable grazing in the fall of 1947.

Then came the spring of 1948. On April 26 it was observed that

the orchard grass required grazing and the Ladino was close behind. Frequent heavy rains had kept the ground soft. Nevertheless, 34 milking cows were turned on the 16 acres on April 26. Some "punching" of the land occurred but it was not serious. The cows came up 15 to 20% in their milk and refused to eat all their grain. In the 18 days before general turning out time in the neighborhood, the extra milk was enough to pay for three years of purchased fertilizer without taking credit for the saving in grain. The cows lacked a little of grazing down the pasture to the proper level and consequently early clipping was done. During the whole of the 1948 season the 16 acres of new pasture supported 34 milking cows at least 70% of the grazing period, which did not end until November 15.

In the late fall and early winter of 1948-49, the pasture was top-dressed with cow manure. In the dry April of 1949 a top-dressing of 400 lbs. to the acre of 0-19-19 with Borax was applied. This year the cows had to be turned out 5 days earlier, or on April 21st, as a means of getting at the orchard grass in time. The Ladino was not quite ready but the cows were turned out regardless, the ground being firm in the spring drouth. The 34 cows, which at first were turned out only in daytime, weren't up to the job and something had to be done. We took 19 big heifers and turned them in with the milkers for a period of 13 or 14 days. This arrangement worked all right since the heifers' pasture of Ladino-Brome-timothy-alfalfa was not in real need of grazing. With 53 head on 16 acres the pasture was fairly well subdued. The pasture was also clipped about June 10.

Not even vigorous growing orchard grass and deep-rooted alfalfa can fully withstand the kind of spring drouth Western New York had in 1949. Ladino couldn't either. Finally the pasture had to be rested. Between April 21 and July 20, a total of 90 days, the pasture was empty for two periods totalling 28 days. As of this writing, July 20, they have been on it again for three weeks and probably will remain there until August 1 when another rest will be required. Elsewhere good aftermath Brome-Ladino-alfalfa awaits the milking herd for the hard pull in the first half of August.

To us at Hayfields, orchard grass can be a holy terror or a great blessing. Never again will we sow it in a far-away dry stock pasture where cattle numbers are usually whatever you have to turn out, mostly too few. We have found a place for orchard grass. It seems to be a moderate-sized pasture near the milking barn where in spring enough cattle can be poured on to it to overwhelm

the tremendous first growth. The later summer growth can be relied upon to come, and this is its great asset. Our 16 acre field is really too big for 34 cows in spring. We intend to graze it two more years and then be ready with a 14 acre piece immediately back of the milking barn. Meanwhile the alfalfa is slowly fading out. The Ladino thrives and the Brome holds its own.

Science at Cornell and elsewhere is working to find or breed better pasture plants for summer growth, with less bulge in spring. Until research makes better summer pasture available we are going to have close at hand at Hayfields one piece of orchard grass for milking cows. Professor Worthen was right. Following his advice made two profits—a little from extra early grazing, and considerably more from high milk production on good mid-summer pasture.

## Revolutionary Milk Cooler

Condensed from Western Farm Life

Milk can be lowered to a temperature of 40 degrees in a few seconds after it leaves the cow's udder by a new "instant milk cooler" invented by Elmer Lundvall of Greeley, Colorado.

The invention which won Lundvall the $200 second prize at the Colorado inventors' congress in 1947 has been further perfected and recently placed on the market. Dr. E. L. Nye, head of the Department of Bacteriology and Pathology at Colorado A & M College, calls the invention the "biggest step forward in the dairy industry for several years."

The new cooler has a brine-filled refrigerating coil which fits into the milking machine pail or into a 10-gallon shipping can. Milk, coming from the cow as she is milked, passes over the coil and is cooled immediately. This permits lowering the temperature of the milk to the desired range between 40 and 50 degrees without allowing it to come in contact with the air or other sources of bacterial contamination.

Advantages of the new cooling method, which operates on the same principle as a home refrigerator, include reduced cooling costs, decreased manual labor in

Reprinted by permission from Western Farm Life
Denver, Col., August 15, 1949

milk handling and assurance of sanitary milk with a low bacteria count.

Milk comes from cows at their body temperature of 101.5 degrees. At this temperature, the number of bacteria in the milk doubles every 20 minutes. After the milk temperature has been lowered to around 40 degrees, the multiplication of bacteria is virtually halted. This is the reason that instant cooling of the milk is so advantageous.

The instant cooler can be used to advantage the year round. It is necessary to keep milk below 50 degrees over night to prevent the bacteria count from going too high. If the cans are cooled to 40 degrees with this machine they can be covered with canvas and will remain sufficiently cool throughout the night. If desired, the brine tank used in the refrigeration process can also be utilized as a holding tank for keeping the milk cold.

In practical tests on the farm, the new cooler has demonstrated its many advantages to dairymen and dairy experts. It has been estimated that the refrigerating system will lower the average farmer's cooling costs 50 per cent.

The new invention is owned jointly by Elmer Lundvall and his brother, Roy, a Greeley real estate man. They have a patent pending. Production of the device, which is made of stainless steel, is through the Instant Milk Cooling Company of Greeley, Colorado.

The new cooler is being manufactured by the Heckethorn Manufacturing and Supply Company of Littleton, Colorado. It will be made available for distribution through various refrigerator companies, according to Roy Lundvall.

## Try Combining Ladino Twice to Get More Seed

**Using two combines to thresh their ladino clover paid off last year for the Jacklin Brothers in Spokane County, Wash.**

**Tailings from the first combine were fed directly into the second machine. The second combine recovered from 50 to 60 pounds of seed per acre.**

**With ladino seed selling for around $2 per pound, the extra threshing was worth at least $100 an acre.**

*—Farm Journal*

# Foreign Trade—A Two-Way Street

Condensed from Marketing Activities

*Fred J. Rossiter*

WE ALL know that exports of wheat, flour, rice, and several other agricultural commodities have been unusually heavy the past three years. We all know, too, that these record exports—stimulated by our foreign relief and rehabilitation operations—will taper off eventually.

But our exports may eventually taper off too far, unless we begin, now, to take positive steps to build up a sound international trade. Our success in building that permanently sound trade will mean much to the wheat farmer, the cotton grower, the tobacco producer, and many other agricultural people whose crops must move to a certain extent in export channels.

In colonial times, foreign trade presented few problems. History records that George Washington, living on his farm in Virginia, shipped tobacco and wheat to England to pay for pottery, textiles, tools, and other industrial equipment. In other words, our colonial fathers shipped agricultural commodities to Europe in exchange for industrial supplies. Later, European capitalists made loans in this country to build factories and railroads, but still we paid our debts largely with agricultural exports.

The importance of agricultural commodities in our export trade began to decline about 1890. The average quantity of agricultural exports didn't decline, but percentage-wise they lost ground to industrial products. By 1910 industrial products represented about 50 percent of our total exports. Except for war periods, this downward trend has continued. Immediately before World War II agriculture was furnishing less than 25 percent of our exports.

One reason for this declining importance of our agricultural exports has been the rapid agricultural expansion in such countries as Canada, Australia, and Argentina. About the turn of the century these countries began producing more grain and livestock products for export. World War I accelerated this development. Importing countries were able to obtain their agricultural needs from these countries often at prices lower than from the United States.

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Another reason for the decline in agricultural exports has been our rapid industrial expansion. Within little more than a hundred years this Nation has built up the greatest industrial plant in the world. Our industrial products are in great demand abroad. For many of them we are the only important supplier. In order to conserve their limited dollars for our industrial products, many nations must turn elsewhere for their agricultural supplies.

This lack of dollars is forcing Western European countries to arrange barter deals with Argentina and the Soviet Union for agricultural supplies. The United Kingdom has just recently consummated agreements with both countries.

This brings up the very tough question of trade balances. It is interesting to note that during much of our history we have exported more than we imported. Until about 1920 the extra exports were needed to pay interest and principal on our debts to foreign investors. We were paying off the debts on our railroads and factories. In September 1914 we still owed Europe about half a billion dollars.

But World War I brought a significant change—we paid off our debts and came out with the rest of the world owing us money. Europe by 1920 owed us half a billion dollars. It is normally considered good business to pay off one's debts. But since we paid off our debts we seem continually to have been in foreign trade trouble. You know the reason: We have continued to export more than we have imported. The foreign countries couldn't pay us the balance, and trouble ensued.

Following World I, this country made substantial loans to Europe for rehabilitation and industrial developments. Then came the depression, our imports dropped, and our lending activities came to an end. Foreign governments found it necessary to restrict imports from the United States, in order to conserve their dollar balances. This trend in conserving dollars continued up to World War II. Foreign governments applied import restrictions, developed uneconomic food production, subsidized exports, devalued currencies, increased import duties, and applied many other trade restrictions.

As far as Latin America is concerned this picture changed during the recent war. At the close of the war nearly every country in the Western Hemisphere had large dollar balances. These had been built up by U. S. purchase of strategic war supplies while, at the same time, our export restrictions limited their purchases from us. As export restrictions were lifted, these countries immediately began procuring large quantities of industrial products in this country. As a result, most

of them used up large portions of their dollar balances.

At the present time only a few countries in the world have a surplus of dollars available for unrestricted use in this country, and once again our exports are far exceeding our imports. In 1948, the value of our total exports are far exceeding our imports. In 1948, the value of our total exports amounted to 12.5 billion dollars, while our imports—though the highest on record—totaled less than 7 billion dollars. That left a 5.5 billion dollar gap last year. This year the total value of our exports will probably be less than last, while the value of our imports may be somewhat greater. Nevertheless, a wide gap still exists. This gap, at the present time, is filled largely through the European Recovery Program and our feeding programs in Germany and Japan.

In light of this situation it is not difficult to understand why foreign governments restrict the use of their limited dollars. Many industrial commodities are available only in the United States. Countries wishing to obtain such products to improve their standard of living find that they must turn to this country. Therefore they either obtain their needed agricultural imports from some other area or subsidize their own farmers in an effort to become self-sufficient in food.

Such action, of course, works to the detriment of United States agriculture. This country, through hard work and ingenuity, has built up the largest agricultural producing plant in our history. Our total agricultural production for the past 10 years has far surpassed that of any country in the world. In expanding this agricultural plant, we had our "growing pains," such as lack of equipment, lack of tractors, and lack of fertilizers. These "growing pains" have now been forgotten. It appears that during the next few years, it may be necessary for us to reduce our agricultural producing plant somewhat and it is probable that our "reducing pains" will be more painful than were the "growing pains."

It appears that after ECA financing is over many countries will have even greater difficulty in paying for agricultural exports. We know that many countries in the world can use our agricultural commodities and it is hoped that some means can be developed whereby it can be made possible for them to pay for the agricultural commodities which we can supply.

Everyone recognizes that a high level of international trade helps to maintain high standards of living at home and abroad. If the United States can help increase international trade on a sound basis, it will mean that other countries will have higher standards of living, more employment, and thus

a greater demand for agricultural commodities. To help build stable international trade, we in the United States must do some constructive thinking and constructive action which will increase our imports to provide dollars for our neighboring countries.

The rice industry, for example, is conscious of the fact that the more sugar the United States purchases from Cuba the more rice and other commodities Cuba is able to purchase in this country. If Cuba is unable to sell substantial quantities of sugar to us, we know that Cuba will have to trade with the country that is willing to trade with her.

The people of the United States must do some serious planning during the next few years in order to help foreign countries earn dollars. Increasing imports is the most important method.

The Reciprocal Trade Agreements Program which has been in effect since 1934 is one important step forward. So far, it has been difficult to measure the value of this program because, soon after it began, war preparations and war itself disrupted normal trade. The principle, however, most people agree, is a good one. It is a step forward—not only toward expanded trade but also toward world peace.

But something more is needed, or else our agricultural exports will shrink materially. Some may feel that the Government should procure our surplus agricultural commodities and ship them abroad at whatever price can be obtained. While this may be a method for containing export trade, many do not believe this to be the most healthy way of developing international trade. Everyone recognizes that there are limits as to what Government can do.

Increased import trade alone cannot completely solve this problem. Other means must also be employed to help build up purchasing power for our commodities. Increased use of foreign ships, planes, and other services—to an extent compatible with our overall national interests—will assist. And tourists' expenditures—for such things as entertainment, textiles, souvenirs, meals, lodgings, and transportation—have a direct bearing on our agricultural exports, because some of the American dollars spent abroad will be used for purchasing our wheat, flour, tobacco, and other farm products.

The ECA rehabilitation program in Europe should greatly aid the European countries in restoring their production. This should increase their exports and improve their economies so that, in the years ahead, they should be able to take sizeable quantities of our agricultural commodities.

In spite of all these programs to aid foreign trade, it is probable we cannot maintain in the long run our present high level of exports. We must expect some shrinkage in our agricultural exports due to *agricultural* recovery abroad. Our industrial exports may also decline as European export capacity is restored.

In brief, international trade is a two-way proposition. If we hope to maintain large exports, we must be willing to help foreign countries earn dollars to buy our products.

## Water Bowls For Pigs

Condensed from Michigan Farmer

PLENTY of clean, fresh water for livestock is just as necessary as feed for economical production, according to Michigan State College animal husbandry department experts. And they claim the only satisfactory way to provide a constant supply of fresh water is through use of some type of automatic waterer attached to the water pump.

The animal husbandry men say many automatic watering devices have the disadvantage of being difficult to keep clean and of flooding the pen or lot. So, with the help of the agricultural engineering department, they developed an automatic self-cleaning water bowl that has proved very successful for hogs.

They used a standard automatic dairy water bowl with a built-in siphon trap and drain similar to that used in a flush toilet. This water bowl has the usual valve mechanism which is operated when the animal drinks.

Whenever a hog holds the valve control down until the bowl fills to within about 2 inches of the top, water runs out the overflow and through the drain, away from the lot or pen. Excess water siphoning out from the bottom of the bowl flushes away dirt which may have accumulated. Flushing may also be done by hand operation of the regular supply valve control.

Further studies of this waterer are being made on its use and possibilities for swine, cattle, sheep and horses. The studies include: Water consumption, time and labor saved, rate of gain and economy of production, and bacteriological studies.

Reprinted by permission from the Michigan Farmer, Detroit, Michigan, Feb., 1949

# The Citrus Business

Condensed from Nation's Business

*Robert West Howard*

ANNUALLY, across the southernmost strip of the nation from California to Florida, glossy, man-made forests of orange groves produce a crate of fruit for every American. It began less than a century ago as a freak of nature —another accident that shrewd men turned into a major industry. Drink a toast to Goa and Bahia, to Billy Saunders and Luther Tibbets, to a nagging wife, a real estate promoter, and thousands of shivering Iowans when you lift your morning's orange juice. They started the citrus business.

The fury of the Civil War ended. Abe Lincoln came home again to sleep in the black prairie loam. From the Missouri River to the Gulf of California, the West opened like a trumpet flower at dawning. The steel bands of the first continental railroad raced from Omaha and Sacramento toward junction in Utah. In the sleepy southern California town of El Pueblo de Nuestra Senora la Reina de Los Angeles de Porcuincula, a half dozen real estate promoters began to dream big dreams for their red and brown desert lands.

The mission built by Spanish Jesuits two centuries before still lay as green oases of irrigation beside the Pacific. In the ruined gardens of San Gabriel, their orange trees produced gnarled, acrid fruit. Now, as the San Bernardino & Los Angeles Land Company, the Southern California Colony Association and others prepared to turn the chaparraled ravines and uplands into home sites, they hit on the idea of promoting orange groves, as well as sunshine, in "golden California."

William Wolfskill, an ex-trapper from Kentucky, had peddled San Gabriel oranges from door to door in "Los Angeles" for 20 years, and even shipped crates as far north as San Francisco and the Nevada mining camps. Matthew Keller imported orange graftings from Central America and Hawaii to set up a rival plantation. There were other orange groves at Highland, San Bernardino and Crafton. The fruit was filled with seeds, pock-marked and more often a dull green than gold. But it made "good copy" for land companies. Advertisements of "golden California," lavish with

Reprinted by permission from Nation's Business
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illustrations of orange groves, began to appear in eastern newspapers. Thousands of families headed west for "the New American Tropics."

Coincidentally, the realtors appealed to congressmen to obtain new varieties of trees, fruit and root crops for their area from the federal Government. In time, their inquiries landed on the desk of William Saunders, superintendent of the experimental gardens operated in Washington by the U. S. Department of Agriculture. A square-bearded Scotsman who was nationally famous for the work he had done in landscaping the new national park of Gettysburg Battlefield, Saunders was currently developing a "botanical detective bureau" for U.S.D.A. to locate possible American crops in other parts of the world.

He had already imported eucalyptus trees from Australia, yellow apples from Russia, and new varieties of clover from England for the Californians. Later on, he would reintroduce the forgotten "Lucerne grass" and start it off to land-fame under the new name of "alfalfa." Now, in 1870, up from the Bahia section of Brazil came the whisper of the thing the Los Angeles realtors might be looking for—a variety of seedless, sweet orange. The fruit originated, the rumor said, in Goa, a Portuguese possession on the west coast of India. The parent trees were like any other orange, save they bore during the winter, instead of the summer months.

The Portuguese, eager for a year-round crop for their Brazilian colonies, had sent specimens into Bahia. There, a generation before, Nature had played a prank by evolving a "sport" tree that produced seedless oranges. By cutting, grafting and recutting, Brazilian growers had developed entire groves of seedless orange trees; they called them "navels," because of a ridge of enfolded skin at the blossom end of the fruit.

Saunders wrote to Portuguese in Bahia, verified the story and ordered a half dozen graftings. At least they'd be worth a trial in the federal greenhouses down the Mall behind the Washington Monument. The package arrived, eventually. Saunders had given the shoots a casual inspection when a letter came from Massachusetts congressman, Gen. Benjamin F. Butler, who had been military governor of New Orleans.

An old friend and associate from Maine, the general's letter explained, had settled recently in Riverside, Calif., near Los Angeles. This gentleman, Luther Tibbets by name, was anxious to obtain graftings of any subtropical plants or trees Saunders' office could supply. It would be considered a personal favor, wrote the general, if Saunders could see fit

to comply, especially since Tibbets was "—er—starting life anew." Once a successful business man in New York, he had lost his fortune because of an obsession for a woman "faith healer." Now, although he had married the woman, he was leaving her in New York to start life anew at Riverside.

Saunders felt a bond of sympathy for any man nagged by a "faith healer." After all, hadn't he, of all the employes in the federal Government, been ordered to escort Mary Todd Lincoln, the President's lady, to her appointments with the fortunetellers every Thursday afternoon?

What to call the graftings? Call 'em "Washington Navels." Saunders reached across the desk for quill and paper to inform Tibbets the package was being shipped, via stage and packet, that day.

Tibbets' orange sprouts from Washington were not considered any great shakes by other Riverside colonists. Bahia oranges already had been imported into the area, via Australia, with little success. Tibbets set them out, grafting them to some sour-orange root stock from the San Gabriel gardens. Then he went about the developments of his 160 acre farm.

The Washington Navels were showing their first lily-like blossoms when a spring wagon pulled up at the front door to deposit Tibbets' "faith healer" wife, Eliza, plus maid, trunks and carpet bags. It was Eliza, and not Luther, who, the records say, entered the first crop of juicy, golden fruit from the three trees at the Orange County Fair, 1879.

It was Eliza who accepted the judges' blue ribbon. And, thereafter, it was Eliza who accepted the $10, $20, and finally $100 that growers offered for each shoot from the Washington Navels. So, naturally, when Riverside citizens erected a memorial to the birthplace of the Navel orange in 1920, Eliza's name went on the marker. To this day, William Saunders and Luther Tibbets play second fiddle to her in the history books.

Nonetheless, there are some 720,000 Washington Navel trees in the Far West today—all of them descendants of Luther and Eliza's three sprouts. The fame of their showy, sweet fruit spread quickly up the Coast. Los Angeles and Riverside growers began to make shipments as far east as St. Louis. The federal Government and state universities turned their attention to development of a "citrus industry." In 1893, after a series of distribution mishaps and frustrated attempts at unionization, the Tibbets' neighbors formed an orange growers' cooperative marketing agency at Riverside. The idea spread south and resulted in creation of the California Fruit Growers Exchange.

In 1907 came the first national harvest from the Tibbets' sprouts. The cooperative farmers decided on a drastic marketing experiment with Iowa selected as a testing ground. The Southern Pacific Railroad offered to underwrite half the cost. Early that fall, billboards blazoned the slogan, "Oranges for Health; California for Wealth."

Des Moines newspapers carried advertisements announcing a prize contest for essays and articles describing California's oranges. Lecturers descended on women's clubs, church societies, luncheon clubs, to extol the virtues of California climate, and pass out free oranges.

That winter freight trains painted a bright orange and draped with bunting toured Iowa, dropping off sample boxes of oranges at every village station. Publicity men telegraphed stories to newspapers. Cash orange sales in Iowa increased 50 per cent that winter; national sales spurted 17.7 per cent. Next year the brand-name "Sunkissed" was proposed for the fruit, then shortened to "Sunkist."

Thus the orange became "big business." The Iowa campaign caught the public fancy. Florida, long experimenting with varieties of Valencias, Kings, and Temples. came into the winter fruit markets with a rush. Arizona, Texas, Louisiana began the development of orange groves. Grapefruit, lime, lemon—the whole imposing family of the citrus grew with them.

This year, again, the American orange crop will exceed 5,000,000 tons, with an average market value of $250,000,000. It began as a prank of Nature in Brazil, 125 years ago. Science and business skill took it from there.

# Select for Production Factors

American Hampshire Herdsman

*W. W. McMillen*

WHY don't we really go in for production testing? The big reason is that it is easier for most of us to do things in same old way rather than do a really constructive job of breeding. Then, too, making money in the swine business during the past few years has been possible without going to the extra effort of producing really efficient hogs. We may be entering a period or even an era in the history of this country when successful operators will need to go all out for production efficiency.

No industry can survive competition in our "streamlined age" with the inefficient methods of the past. How much have breeding and selection as we have practiced them really improved our hogs since the major breeds became well established in this country about 1890? Sows then raised almost a six pig average. Today our national average is about 6.3. You say it used to take eight or nine months to get pigs ready for market, and now we do it in five and a half months. In some cases, yes, but still most of our spring pigs are farrowed in March or early April and the big share of them come to market in November and December. Then too, better feeding practices have decreased the time required to reach market weight.

The average sow produces 15 to 30 or more egg cells during the heat period. The best evidence we have is that 11 of these are fertilized and start to develop, only 9 pigs are born and about 6 raised. Of the six raised per litter in this country how many are managed so that they grow normally and reach a profitable market? Your guess is as good as mine. I'll say 3 or 4. Can you refer me to any other industry where there are so many leaks?

Unless we improve our methods very soon other competitive meats and some vegetable products are going to cut roads into our market. In times of declining prices the American consumer is looking for the most economical food product for the money.

How are we going to step up this production efficiency? The first step is to understand what the production factors are and some-

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Peoria, Illinois, August, 1949

thing about their importance. There are four factors of fundamental importance:

1. Large litters. Consistent production of large litters is impossible unless breeding stock comes from families that are prolific.

2. Mothering ability. It is important that sows know how to take care of pigs and give them plenty of milk. The good producing, "milky" sow will get thin while nursing her litter. When pigs get plenty of milk they will weigh 30 or 40 pounds or more at weaning time. Fat, nice-looking sows when the pigs are weaned are often the poorest producers. Sow testing records for 1,198 litters on Michigan farms show that pigs from large litters are as heavy at weaning as pigs from small litters. Pigs from 143 litters with 11 or more pigs averaged 33 pounds at 56 days of age, as compared with 32.9 pounds per pig for 167 litters averaging 6 pigs or fewer. Size of litter, therefore, is the most important factor in attaining heavy litter weights.

3. Rate and economy of gain. In general, thrifty, fast-growing pigs are profit makers.

4. Carcass excellence. Hogs are not generally sold in this country on the basis of carcass grade. The swine industry will be on a firm footing if all producers will select meaty breeding hogs with plenty of length and quality.

I would hesitate to rank these four factors in order of importance because they are all necessary. If we start at the foundation to build a production program, we should start with No. 1—prolificacy. Unless our brood sows and gilts consistently produce large litters we might as well start over. It takes a long time to increase prolificacy by selection from an unprolific herd.

There is nothing more discouraging in the hog business than to have sows start tramping their pigs or to carelessly mash them. Then, too, it is very disappointing to have a nice litter of 12 or 14 pigs and find that the mother has only 8 or 10 good teats or possibly some blind ones. It is worth a lot to have the kind of sows that possess the udder equipment and know how to raise pigs. Commercial swine producers are demanding prolific, broody sows with ruggedness, size and length. They will pay well and come back to farms where they can buy gilts and boars with underlines showing 12 or more prominent nipples that later pay off in good litters raised.

A number of breeders today are overlooking some of the most important points in type. Length, size, character, ruggedness and quality are the indications of productiveness. If your hogs have these qualities, you won't have to worry about thickness and so called "feeding quality." With ruggedness and size one gets

growth ability and fast gains—the kind of growth that pays off in the feed-lot and in the breeding herd. If thickness means fat or grease, it is a disadvantage in merchandising the product and in the breeding program. Many times you and I have seen the fat show sows and over-fat sale gilts perform poorly as mothers. We haven't made much improvement in production factors selecting that kind over the years. Why don't we put a premium on production factors—the things that really pay off? We should have shows that pay real premiums for PR sows and litters of the right type. Breeders who know type and will produce strains of hogs that show production characteristics and then really produce for the customers are going to be the top breeders as time goes by.

One can have the best producing hogs in the country and it won't do much good unless people know about it. Enter those good litters in Production Registry and take advantage of the advertising. Of course, it is much more valuable to rank high in herd production rather than have a few good litters. Have one of the top herds in Production Testing, and then win a carcass contest somewhere and see what happens to your sales and the popularity of your herd.

## The Feeding of Dry Cows

Condensed from Maryland Farmer

*Logan T. Wilson, Ph.D.*

Most good dairymen aim to have the biggest proportion of cows freshen in the fall. It has been demonstrated that cows freshening at this time give a higher annual production than those freshening at any other season. In addition milk prices are higher in fall and winter. In some fluid milk markets, the farmer's production during fall months establishes his base for Class I milk throughout the year, so high production at this time means higher prices the rest of the year.

A dry period with proper feed and care for the dairy cow is essential for long-time high milk production. Dairymen long have realized the importance of giving the cow a rest period of from 6 to 8 weeks between lactations. Highly

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developed dairy cows usually need special care to get them dry. In this regard, it is important to record breeding dates and to check them regularly in order to know when to start the drying-off procedure.

In drying off high-producing cows, there is no one best method for all animals. First, the tendency to heavy milk flow can be reduced by temporarily cutting down on feed, particularly pasture, silage and grain. Low protein hay can be used to supply bulk and satisfy appetite. A common method of drying cows is to skip milkings with increasing frequency until milking can be stopped entirely. Another method is to just stop milking. This builds up pressure in the udder which shuts off milk secretion. This method is easiest, but should not be used on cows with infected quarters or a history of mastitis or garget.

Too many dairymen, however, fail to use the dry period to the best advantage for fitting the cow for freshening. It should be remembered that the dry cow is not on vacation. She has three jobs to do.

First, she must meet the growing demands of the calf she is carrying. The requirements, especially for minerals and vitamins, are high during the last months of pregnancy. A good supply of these nutrients is essential for the development and vitality of both the calf and the cow.

Second, the dry cow should replenish her system with nutrients depleted during the lactation she has just finished. During high production cows tend to draw on their body fat, and to use minerals, vitamins and protein from bones and body tissues. If these are restored during the dry period, the cow can continue high production year after year.

Third, the freshening cow must prepare herself for the strain of calf birth, followed by heavy milk production. With proper nutrition and conditioning, the cow's reproductive system goes through its normal development for easy birth, without complications. It is a common observation that thin cows with rough coats and tight hides tend to have more difficulty at calving along with retained afterbirths and infections. Also, the freshening cow is regenerating her mammary tissue (bagging up) and beginning to secrete colostrum for her calf. The good dairyman likes to see the udder well-developed and full at calving time.

The dry and freshening cows should be given the best pasture, or hay and silage available. These are the regular sources of vitamins A and D and many of the minerals which are especially needed at this time. Insufficient Vitamin

A results in the birth of dead calves or of weak calves which are susceptible to scours and pneumonia. Lack of vitamin A also produces a high occurrence of retained after-births. When such troubles occur and it is not practical to improve the pasture or roughage at the time, it may pay to feed a vitamin A supplement in the form of shark liver oil or other vitamin A concentrate. Extra vitamin D can be supplied as irradiated yeast, either included in the grain mixture or fed separately. Additional minerals can also be supplied in these ways.

It is a good practice to use a special fitting feed for dry cows,—one containing dehydrated alfalfa, irradiated yeast and supplemental minerals. About 14% of protein is usually best at this time. The amount of grain fed should be adjusted to the cow's condition and the length of the dry period. A large cow in thin flesh can well be fed 8 to 10 lbs. per day. Cows in medium or good condition can be fed less grain, accordingly, and in some cases none at all. The aim is to have the cow well fleshed at calving time, but not "hog-fat."

Just before freshening, it is best to reduce the amount of grain somewhat and to make sure that the cow is in a fairly laxative condition. The fullness of the udder is a good indication as to when to reduce the amount of grain. Too much feed just before calving may stimulate a premature milk flow, or cause the udder to become hard and congested. At this time the fitting ration can be lightened up and made more laxative by adding, bran, molasses, brewers grains with molasses, or beet pulp with molasses.

After the calf is dropped continue the fitting ration for the first 2 to 4 weeks, when the cow can be changed over to the regular production ration. During this time the amount of grain should be brought up gradually to full feed according to the cow's appetite and rate of milk flow.

# Flexible Farming is Best

Condensed from Successful Farming

*R. W. Worcester and Earl O. Heady*
Iowa State College

FARMERS who can shift their plans to keep production and costs in line with changing economic conditions are in the strongest position.

Flexible farming puts you in a better position to take advantage of a sure thing when it does come along. And it also acts as a hedge against unfavorable price changes when the outlook is uncertain.

Even during the last several years, when rising price levels helped even the *most inefficient* farmers make a profit, there's been the same old spread among the incomes of different farmers. Some farmers do exceptionally well; others continue to "just get along."

Often flexibility has made the difference.

In the period ahead, this will be even more important because of changing, uncertain economic conditions. But you can take advantage of these changes rather than be hurt by them. The man who plans to adjust his business from time to time on the basis of the best information he can get is going to be better off than the man who blindly follows the same program year after year.

*The problem is to keep your farm output high as long as prices are up, yet be ready to get out from under in case prices start down.*

Farmers have found the first thing to do is to keep informed on the economic outlook. Without some knowledge of economic conditions, most adjustments they might make in their farming program could be largely a guess.

Here's how a number of Iowa farmers use different flexibilities in their farm operations. Some of the ideas might work on your farm.

Take the case of Max Bailey, Story County. Ordinarily you don't think of permanent pasture as a source of flexibility. But it is for Max. Each year his pasture feeds some kind of roughage-consuming livestock—which ever seems to be the best bet. He carried dairy heifers on that pasture this summer. A year ago he bought ewes in the fall and carried them through. The year before that he had beef steers.

"I had a chance to buy some ewes again this spring, but I turned it down. A week later I

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Des Moines, Iowa, August, 1949

realized I had made a mistake," he says. The dairy heifers had looked like the best bet.

There's flexibility in buildings, too. For instance, a general-purpose barn which can be used for more than one type of livestock.

Eldon Olson, Boone County, milks cows in his combination hog and poultry house. Built with removable farrowing pens and with storage space for feed overhead, this barn houses between 100 and 150 hens and some hogs over winter. The 5 milk cows are sheltered outside in a small, open shed. They're brought into one corner of the barn for milking and feeding twice a day. A handy system of feed chutes brings his feeds down from the overhead bins.

Eldon may not have the best possible building setup for hens, for hogs, or for his dairy cows. But with this barn—a neighbor calls it "Noah's Ark"—he can handle all three types of animals very nicely. And he can shift back and forth from one type to the other with no extra building costs.

Dwight Cartwright, of Greene County, remodeled an old horse barn to serve this same purpose. Former horse stalls now provide housing for his hogs, or shelter his feeder cattle. One corner is walled off and fitted with stanchions for his three milk cows. This corner would also serve as a milking parlor if he ever decided to keep a full-sized dairy herd.

Dwight converted old horse mangers into calf feeders. Another farmer uses old horse stalls for farrowing. He knocked the bottom plank out of old mangers so the little pigs could run in. Then he hung heat lamps over each manger to keep the pigs warm during early farrowing.

These farmers are getting flexibility by shifting in and out of different types of livestock, something that not all farmers may be in a position to do. But you can get flexibility within an enterprise, too. With beef cattle especially, it's easy because of the many different grades and types of cattle that can be handled. Many hog farmers change their farrowing programs and feeding practices from year to year in line with the way the market looks.

William McGinnis and his father, of Washington County, raise hogs on such a program. Last year they had 38 spring litters and 85 fall ones. This spring they had 70 sows to farrow; 75 litters are planned for this fall.

Spring farrowing in 1948 was held below average because of the short supply of corn and high feed prices. Pigs, farrowed in March, were pushed for an early market in August and early September at near-peak prices.

Then to adjust their program to the new corn crop and the more favorable feeding ratios expected last fall, the McGinnises rented

timber pasture and farrowed some of their fall sows there in July and August. The remaining sows and gilts were farrowed on new legume seedings in September and October. All 685 fall pigs were fattened on new corn.

Of the fall litters this season, 42 gilts farrowed in June and July. These pigs can be marketed in February, or they can be held to heavier weights if the price looks good. The other 33 sows will farrow in August and September, and the pigs will be pushed to reach the market before April 1, 1950—while price supports are still in effect if that remains a consideration at the time.

When the packing-house workers went on strike in the spring of 1948, the McGinnises were caught with 200-pound hogs on their hands. Here's how they rode out the situation: While the strike kept hog marketings at a standstill, the hogs were "held" on alfalfa pasture and a very limited feed of corn. When the strike ended, the hogs were in good shape after low-cost keep on alfalfa.

Any production plan that delays the final decision of when and how you market your animals is a good hedge against uncertainty.

This calls for *turning points* where you can re-examine the outlook and then adjust your plans if you need to. The point is: You can gauge the market a lot better at close range.

If you had to make the early-and-light or late-and-heavy decision early in the season, you could only make a rough guess. And you'll agree there's enough guessing to farming even at close range.

Although some roughage or protein feeds can substitute for grain in feeding hogs, your job here is mainly one of converting corn into pork. With beef cattle, on the other hand, there's a much wider range within which roughages substitute for grain in the feeding program. Quite a few farmers have taken advantage of this to work the turning-point idea into their cattle-feeding operations this year. Harlan Kroger's beef calves (Clinton County) are a good example.

Harlan bought 18 calves during October and November last fall at an average weight around 515 pounds. By April 1 these calves averaged at least 700 pounds and were carrying a good deal of flesh. As soon as good pasture became available, they were turned in on grass, still with a full feed of corn. The way he figured, the calves would be ready for market in July. But if the price looked good then, they could be carried along to September or October. All along, the animals would be in good enough shape so that they could be shipped to market on short notice

almost any time after the first of April.

A slower program using more roughage would have brought the calves to market later on in the fall, with no chance to market them earlier if the prices started to drop in the meantime. This way, a reasonable price on the early market was fairly certain; however, the calves could be kept on if the market held strong.

Most things on your farm involve flexibility one way or another. Any time you can hold down fixed investments in buildings or equipment and operate on a pay-as-you-go basis, you gain flexibility. At the same time, no farmer can afford to skimp on buildings that hold down his volume of business or keep him from taking advantage of price-support operations.

An Illinois farmer figured his barn problem this way:

He needed a barn right away for hay storage and as shed room for his feeder cattle. But because a new cheese factory might open in the community, he wanted to leave the way open for a switch to dairying later on.

He considered several barn types. One would cost him $5,000 and would last 50 years. Yearly depreciation would average $100, lower than for any other barn he could build.

However, since he was uncertain about future plans, he built a 15-year barn costing about $2,000. Yearly depreciation on this would run about $133.

Neither barn was what he needed for dairying. But if he built the $5,000 barn, a switch to dairying at the end of 8 years would leave about $4,200 invested in a building that didn't fit his needs. With the cheaper barn, a switch to dairying after 8 years would leave only $935 invested in the old barn. A difference of roughly $3,300.

When prices are high, hiring some of your machine work done on a custom basis may be cheaper in the long run than investing in machinery at high prices. At other times, when owning the needed equipment and power means getting the field work done on time, the timeliness gained may be worth the added investment in machines.

Renting a farm leaves you free of long-termed financial commitments—but which you might have to meet out of a much lower income if you bought now on a mortgage.

Usually it's possible to shift in and out of special crops without interrupting your basic crop rotation very much. But shifting in and out of special crops isn't the only way you can get flexibility in your crop program. In years when your hay crop is a little short, it might pay to turn some of your field corn into silage to

balance out your feed supply. At other times, putting up grass silage with ground corn added to it might help get this same balance.

Certain combinations of equipment are more flexible in their use than others. For instance, if you use a field chopper for putting up dry, chopped hay, you can also make grass silage and row-crop silage with the same set of equipment. Since it takes a large volume to make such equipment pay, it helps if you can use it for more than one operation.

Following the short corn crop in 1947, some farmers risked 5 or 10 acres of corn planted earlier than usual. They figured the risk of frost was worth the chance of getting new corn a little earlier in the fall. If a freeze had come, the corn could have been replanted to soybeans or some other crop. The few acres involved wouldn't have affected their over-all feed supplies much.

Seeding both red clover and alfalfa in a hay mixture is a form of flexibility. Usually the red clover produces best the first year. Then if another seeding doesn't catch very well, the alfalfa can be held a second year.

On the typical Cornbelt farm, the "farm flock" is often a minor enterprise averaging from 150 to 200 hens. It's usually sized to the time and interest that the farm wife can devote to it. Nevertheless, the poultry enterprise offers flexibility within the limits of the housing and equipment you have available. On many farms it fills in the gap where other enterprises do not fully occupy the labor and management provided by the family.

Working flexibility into your farming operations may not make you a big profit, but it can make a reasonable profit more certain.

How much certainty a man wants may depend partly on his financial position. The man who has his farm paid for and his own cash to invest can afford greater risks than the man whose financial position isn't so sound.

One man aims for a higher return with greater chances for a loss. But he can stand the loss if it comes; he'll win in the long run, if his judgment is sound.

The man who lacks capital is better off working for a smaller, more certain income. He can't afford to risk losses that his financial position cannot weather.

Some costs may be a little higher under a flexible system than they would otherwise be. Thus a general-purpose barn may not be quite as efficient for housing a particular kind of livestock as one built especially for that purpose. And, too, a farmer in a specialized farming area might have little reason to build a general-purpose barn. Or a program that pushes beef feeders along on full feed

with pasture might not give you as cheap gains as a program that roughs the feeders along on pasture and hay to market later on.

But a general-purpose barn enables you to switch your livestock program around frequently with no extra costs, while a specialized barn might not. And your cheaper, high-roughage gains might not be so "cheap" in years when prices slip around the normal marketing date.

Actually, many farmers can work flexibility into their operations without changing their business very much. By just thinking and planning in terms of adjustments and flexibility you can reduce risks and still take full advantage of any good opportunities that come along.

## Seal Your Crops in Cans

**Here is a brand-new way to store hay, ensilage, and grain. Simply seal it in an airtight can, safe from rats, bugs, and loss of vitamins. The new-found fact that this idea works on a practical scale is big crop storage news.**

**In Wisconsin, the A. O. Smith Company tried the idea in their steel, glass-lined silos. These first went on sale a few years ago for normal ensilage storage. But the silos are airtight, feature a mechanical unloader which removes the stored product from the bottom without letting in enough air to harm the ensilage. Why not try it with hay and corn?**

**Filled with high-moisture shelled corn, the silo did the job perfectly. The corn kept, since there was no air in which it could spoil. Chopped hay, put in at the medium-wet stage—about 45 percent moisture—not only didn't spoil, but came out as bright and green as it went in. Its food value, apparently, was still all there. Dairy cattle preferred it to other hay.**

**These tests are not yet complete. But if further trials give as good results, we will find ourselves with a completely new method of storage. It is compact, safe, efficient. There is no artificial heat, no fuel or power costs. For ensilage there is no spoilage. For hay, no heating, little or no loss of food value. For small grain and corn, no spoilage, insect or rodent damage. Grain under loan in such silos should keep almost indefinitely. Costs compare favorably with standard silos equipped with unloaders.**

—*Successful Farming*

# Brooding Gets the "New Look"

Condensed from New Jersey Farm and Garden

*J. Frank Gordy*

DEEP houses, long pens, central heat and automatic feeding are giving a "new look" to the Delmarva broiler area. Already a one-man, 70,000-bird unit is a possibility—and at an operating cost of at least 10% under conventional brooding methods.

We are seeing chicks brooded under nothing but a canopy of warm air, 10,000–12,000 to a pen. We have reports where chicks have been housed for under $1 each in super-deluxe houses. These include automatic feeding and watering, insulated quarters, two 150-foot-long hot water brooders, heater, feed room, and even a heat-reflecting, fireproof roof!

True, there was central heating here a quarter century ago, but as houses grew longer it all but disappeared. Now, with improved heating units, more efficient circulators and fans for houses up to 30,000 capacity, much more interest has been shown towards brooding with central heat, both hot air and hot water.

Mr. Friedel of Seaford, Del., has been growing broilers for about 15 years and has a house capacity of 30,000 birds. Most of his old houses are about 20 feet in depth, and heated by individual oil stoves. The new house has an even span roof and is 44 feet deep. It has an over-all length of 200 feet, including a feed and furnace room 15 × 44 feet.

With the concrete floor in the feed and furnace room at a level that permits driving down through the center of the entire house, and with large, double doors, at either end of the feed room, Mr. Friedel has indeed achieved convenience and a saving in labor. The walls are of cinder block with sliding windows on the outside of the house. The rafters are covered with one-quarter-inch insulating board, covered with channel drain, sheet aluminum. A central, hot water heating system with stoker feed and an automatic ash remover is fired with buckwheat coal. There are two lines of six 1¼-inch pipes running lengthwise through the house, and four circulators assist in maintaining uniform temperatures.

For the first lot, 13,000 chicks are placed in the two pens of this house. This allows about 0.6

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Sea Isle City, N. J. August, 1949

square foot of floor space per chick started. The total cost of the house and all equipment, including an automatic feeder and 28 sixteen-inch, circular-type automatic water fountains, was slightly less than $1.00 per chick.

Over the pipes, as a hover and heat reflector, two thicknesses of a 15-pound paper are used. Pilot lights are spaced about every 10 feet under the pipes.

From his limited experience to date with his new broiler house design and labor saving devices, Mr. Friedel estimates a saving of one-half in labor. Judging from their appearance when seen at 5½ weeks of age, his birds were well on their way to finishing off very desirably.

L. B. Brittingham & Son, of Laurel, Del., is one of those successful father-son partnership businesses. Mr. Brittingham started in the broiler business about 15 years ago and at the present time has a housing capacity of 170,000 on his own farms. In addition, about 300,000 are being fed on shares or in rented houses.

Mr. Brittingham's "deep house" is 44 × 300 feet, and he started 24,000 chicks the last part of May. Fuel cost for this brood was only $30. Buckwheat coal was used to heat the hot water. He believes this number of chicks is too great to obtain best results in uniformity and quality, although at about 10 weeks they were quite uniform and well feathered.

Regardless of the outcome with this flock, and the fact he feels they are too crowded, Mr. Brittingham is very enthusiastic about his deep house, long pens, central heat, and automatic feeder. "It's one of the easiest houses to ventilate I've ever had," says Mr. Brittingham, "and I believe one man can take care of three house units this size (total of 72,000 capacity) just as easy as he can care for 12,000 in my other houses. And best of all," continues Mr. Brittingham, "I expect to cut my cost of production at least 10% by using central heat, automatic feeders, and larger pens."

Mr. Brittingham has had some satisfactory results with the use of automatic feeders in some of his older, shallow houses, too. Recently the feed cost for 20,000 birds using an automatic feeder was no greater than that for 17,000 in the other end of the same 20-foot-deep house fed by hand in typical feeders used on his farms. He attributes his lower feed cost to less wastage and increased rate of gain.

Still another phase of the "new look" in brooding in this area has been central heat using hot air. One of the early ventures of this method was on an experimental basis at the Broiler Substation, located near Georgetown, Del. This testing has been under the direction of the Poultry and Ani-

mal Indusry Department of the University of Delaware. A third lot is now being raised in this series of comparisons with individual stoves. The first two tests completed involved approximately 20,000 birds.

Following this installation at the Substation, larger installations on commercial broiler farms have been made with some improvements. From reports and observations, there is serious doubt as to the need for offset pipes and hovers from the main ducts.

For houses of capacity greater than 10,–12,000, it appears that an adaptation of this hot air heating method can be used. One such installation of interest—although it may take severe weather to put it to final test—is that of William Lane and Howe Lagarde in Talbot County, Md.

Steam pipes going in each direction from the boiler lead into a heat exchanger located about midway of a 10,–12,000 size pen. In the exchanger, steam from the boiler and automatic stoker is converted into warm air. This is forced by blowers through ducts, off of which lead a series of 8-inch stovepipes. The mouths of the pipes are 15 feet apart, 18 inches above the floor.

Constant temperature control is regulated by a thermostat at the exchanger, and uniform velocity is achieved by graduating the size of the ducts. The blowers are connected to outside vents to bring in fresh air in desired quantities. In the summer time, a direct hookup with the outside vents, possibly blown over ice, can effect efficient air conditioning. Humidity can be introduced manually as needed by letting steam through needle valves. Rice coal, which is less than half the cost of nut coal, is successfully utilized by the boiler.

Thus, the ultimate in brooding—no hovers at all, just a canopy of warm air over the chicks. In tests at the Substation at Georgetown, it was learned that chicks could withstand warm air blasts several times stronger than ever would be developed under normal conditions.

In conclusion, it must be admitted that some of today's "new look" in brooding is, after all, yesterday's brooding equipment and practices with certain adaptations and improvements. It is safe to bet that the outcome of this rather revolutionary period will do much to increase the efficiency of production, whatever form brooding finally may take.

# "It's Impossible" . . . but He Does It!

Condensed from the Acco Press

*Bill Tipton*

ROBERT Harper, well-known seed breeder in Caldwell County, Texas, is doing what a lot of folks say can't be done. He's growing hybrid corn on the same land year after consecutive year without depleting the land and without decreasing his yields. In fact, yields are better now than when he started.

Before you say "Impossible!" Let me explain that his corn is produced on the same land year after year, but not in the the same rows. His 600 acres of corn production is beautiful to see, corn planted thick in the row, 5000 plants to the square acre, with two rows of seed corn, then—and here's the secret of his success—two blank rows left for soil building. And it's in these blank rows that he uses an intensive legume-soil building program which keeps his soil fertile year after year.

Bob Harper is quick to give credit for his plan to an expert. "I have Homer E. Rea, clover expert and associate professor of agronomy at Texas A. & M. College, to thank for figuring this one out," he says. "I had always had an idea that soil could be rebuilt faster than some folks thought, and when Homer Rea and I began to talk about the possibilities of alternating rows and then planting a crop ticker in the row to make up the skips, he drew up the plan and we put it into effect."

Harper began this soil building program in 1940. He side dresses his corn with 16-20-0, uses 200 pounds of superphosphate to the acre under his legumes, and irrigates when needed, with a tractor furnishing the lift power from the shallow wells on the place. Incidentally, he has six tractors, one for each 100 acres, so that he can finish any job in three days by throwing all his tractor- and man-power into the work. When the rebuilding program started, the land was producing 16 bushels to the acre, now averages 32 bushels, has run as high as 62 bushels to the acre. The way the field is laid out, four rows of corn make an acre.

The rebuilding in the blank rows runs something like this: Dixie Wonder Peas or Austrian Winter Peas, followed by Brabham Summer Peas, the Melilotus In-

Reprinted by permission from the Acco Press
Houston, Texas, August, 1949

dica (yellow blossom clover). When the latter crop is turned under, that's a tremendous green manure crop in the ground, ready to boost the corn out of the ground when it's planted.

"Sticking with it is what pays," Mr. Harper is quick to point out. "No one will be able to get sustained yields and keep the land built up with a hit-and-miss program. It must be followed year after year to be successful."

Last year, Mr. Harper conducted various tests with hybrid corn to see what different practices would produce in the way of yields. He took some land where no soil building had been practiced and where cotton had been in cultivation the previous year. Planting hybrid corn, he got 19¼ bushels to the acre.

On another plot, he planted hybrid corn following clover and on which no fertilizer was used, and got 28.75 bushels to the acre. On a plot which followed clover and peas, and on which no fertilizer was used, he got an astounding 52¼ bushels.

On still another plot, in which corn was planted following peas and clover, and was side dressed with ammonium nitrate, he got 62½ bushels. This high yield was obtained by applying superphosphate under the peas and clover the season before, by turning the clover under in May, planting Brabham Summer Peas and turning them under in September, and then using 150 pounds of the ammonium nitrate to the acre as side dressing on the corn.

In all these tests, conducted on land which had been in cultivation for 70 years, the weather conditions were unusually dry. During May and June, the region got only two inches of rainfall.

Robert Harper has done equally well in cotton tests in demonstrating the value of soil building. Last year he conducted these tests: (1) cotton following cotton, on land which had no treatment, got 630 pounds of seed cotton to the acre, with an acre value for seed and lint of $78.60; (2) cotton following cotton, but with 200 pounds of superphosphate per acre added, got 820 pounds of seed cotton, $120.04 in revenue; (3) cotton following clover, using the same amount of superphosphate per acre, got 940 pounds of seed cotton, revenue of $131.63; (4) cotton following Dixie Wonder peas with the superphosphate treatment added got 1020 pounds of seed $137.08 in revenue; and (5) cotton following Dixie Wonder Peas and clover mixed, with 100 pounds of superphosphate plowed under in March, planted Brabham Summer Peas with 100 pounds of superphosphate, plowed under in November. This test secured a yield of 1,167 pounds of seed cotton, brought in $148.22.

Mr. Harper had an interesting

test previous to that with vetch. On (1) a tract with no treatment, the land produced 754 pounds of seed cotton to the acre; (2) a tract which was planted to vetch in the fall of 1945 with no phosphate under it, and was turned under in the spring, then was planted to cotton, produced 798 pounds of seed cotton; (3) the same treatment as in number 2, except for the addition of superphosphate: 180 pounds of superphosphate was applied and vetch planted in the fall of 1945, was turned under in the spring of 1946, and cotton was planted. It produced a bumper 1,376 pounds of seed cotton to the acre. There's little wonder that Mr. Harper gives superphosphate the credit for the greatly increased yield on these identical tests, with the same kind of seed.

I raised the question of vetch as a winter cover crop for corn land, and Mr. Harper explained, "It doesn't mature fast enough for our corn treatment, grows too rank, and balls up when turned under. It's a fine legume under cotton and for this area generally, but we'll take Dixie Wonder Peas, Austrian Winter Peas, Brabham Summer Peas, and Yellow Blossom Clover for our corn land. We always have an experimental field here, however, in which we cooperate with Texas Agricultural Experiment Station on cotton yield tests following vetch." His field of vetch, which had been planted in rows, was so heavily matted it appeared to have been broadcast.

Mr. Harper also has a five-acre block for Texas Agricultural Experiment Station hybrid corn tests. "It's interesting to watch the results of various crosses. It is almost like having the future unfold before your eyes, for actual trends are established by these experimental crosses, and we know from these results what will be in demand two or three years down the road," he says.

Harper sells around 25,000 bushels of hybrid corn planting seed each year. In order to handle that volume of business, Robert Harper has a plant investment in excess of $125,000. He has a drier where hybrid seed corn is dried in the ear, the secret of getting good seed, with a capacity of drying 2400 bushels each 100 hours. Eleven of the Texas hybrids are being produced by Mr. Harper.

All planting seed goes through a grading system that includes six separate steps—cleaning, separating round and flat seed, separating flat seeds by widths, flotation or weight, gravity grading, grading by length of seed, and treating.

While Robert Harper has been in the hybrid corn seed business only since 1940, he's been in the seed business since 1916.

Mr. Harper has a complete soil conservation system set up for his

640-acre home place, laid out by Soil Conservation Service technicians. "We have planned it to catch and hold every drop of water that falls on the place," he says. He has a dam to catch the water, protect the fields below.

If you want to see a pretty sight, you ought to see that 600 acres of corn when it's in full growth. But one of the best tests of the value of the soil building work is to check Robert Harper's corn against a neighboring field where there is no regular soil building program under way. When Robert Harper's corn was head high, his neighboring field was only knee high, and they were planted on the same date! The corn in Harper's field was a deep rich green, that in the neighboring field had a yellow cast to it. Seeing's believing, they say, and all you have to do is look to see that Harper's soil building system is paying off.

## Fowl Paralysis

Condensed from Everybody's Poultry Magazine

*Erwin Jungherr*

ALTHOUGH we hear a lot about Newcastle disease and other respiratory troubles, fowl paralysis, or leukosis, is still the number one killer of adult poultry. It has been estimated that total mortality due to all poultry diseases amounts to 25 to 33 percent among chickens under 18 months of age. Almost one-half of this mortality is due to fowl paralysis and kindred diseases.

The losses due to leukosis must run into many millions of dollars a year, yet on account of the insidious nature of the disease and the lack of definite control measures, even the available knowledge is not fully applied in the fight against fowl paralysis. The importance of the problem, however, was recognized as early as 1938 when the Government decided to erect a special United States Regional Research Laboratory at East Lansing, Michigan for study of the disease.

Fowl paralysis is not new. The first report from Europe dates back to 1907. Less than a decade later the disease was found in this country. It is now known to occur in every major poultry producing area of the world. Turkeys and pheasants occasionally

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Hanover, Penna. September, 1949

become affected. Since the disease comes on gradually during the growing period and early maturity, when many other diseases take their toll, it is not surprising that fowl paralysis has been found associated with a number of diseases. Other diseases have, for this reason, often been accused of actually bringing on fowl paralysis.

No germ, mold coccidium, or worm has ever been incriminated as the cause of leukosis. From the fact that tissue extracts freed from bacteria by means of filters are still capable of transmitting the disease, the cause is assumed to be a virus. No one has seen this virus under ordinary light microscopes but a few claim to have seen it under powerful electron microscopes.

The virus of leukosis has some things in common with other viruses, such as those causing Newcastle disease and infectious bronchitis, principally that it can not be grown like bacteria in the laboratory. The leukosis virus, however, differs from other viruses mainly in the fact that it causes a variety of diseases. These are often characterized by tumor formation, so scientists, even today, are not sure whether a single virus or several viruses are responsible for what is usually called the fowl paralysis or the leukosis complex.

Regardless of the details, the essential point is the modern recognition that fowl paralysis is an infectious disease capable of spreading and perhaps subject to control measures which have proved effective in other infectious diseases.

As indicated above, fowl paralysis makes its appearance in several forms which partially overlap or occur one after another in the same flock. Thus strict separation of the fowl paralysis forms may be alright for the scientists but from the practical point of view and that of future control, fowl paralysis constitues one major overall problem for the poultry industry.

Range paralysis is the common form. The name is somewhat misleading because the disease occurs not only on the range but even in the brooder and in the laying house. The sex difference in the incidence is quite striking with the female in this case being really the weaker, more susceptible sex. Apparently, the male sex glands exert some protection against the virus.

The affection usually starts in a leg or wing, the latter being droopy and dragging on the ground, while the leg either shows a stilted gait or is limply stretched forward or backward. If the paralysis is in the neck, the birds may gasp or drool. Ordi-

nary postmortem examination reveals nothing but a half-starved bird, but lifting up the inner thigh muscles often exposes a swollen, thickened sciatic nerve. Occasionally, the changes in the nervous system are so minute that they can be seen only with the aid of a microscope.

"Gray" or "pearly" eyes have long been known to occur more frequently in flocks where range paralysis is common. As is well known, the color of the iris varies with different breeds of birds; furthermore the iris gets pale during heavy egg production and other normal conditions. The gray eye indicative of leukosis shows an irregular, contracted pupil and the surrounding iris is dull and opaque. This condition is most common in laying birds and may serve as an indication as to the extent of leukosis in a breeding flock.

Big liver disease (lymphomatosis) is the internal form of fowl paralysis and the real culprit. It is extremely widespread, kills the best birds during the height of productive capacity, and may take weeks or months to cause any outward signs. In brief, big liver disease is a grayish tumor that attacks all kinds of internal organs such as liver, spleen, ovary, heart, kidney and intestine.

The professional poultryman and the breeder, must get to know the disease in its various disguises. Knowledge as to the overall incidence of fowl paralysis in a well-established and well-managed flock is as good as half of the battle won against the disease.

The other half of the fight is based primarily upon two points: first that one is dealing with an infectious disease, secondly that this particular type of infection needs a genetically susceptible bird.

How the infection is spread is always difficult to say, but it is certain that newly-hatched chicks are most susceptible to this contagion. Hence the practical rule, put forth by Cornell investigators, to raise chicks as far apart from old birds as possible. Transmission of the infection may even start before hatching, perhaps in the incubator.

Although the scientific dot has not been put on the experimental proof, there is little doubt that the infection is also spread through the egg. In spite of this, sanitation during the brooder stage remains the most potent factor in the control of fowl paralysis. S a n i t a r y precautions should extend even to such minor operations as vaccinating by the stick method, caponizing, and dubbing, because in certain forms

of fowl paralysis it takes only a very small amount of blood to transmit the disease.

The influence of the genetic makeup of the birds upon the susceptibility to fowl paralysis is one of the most important discoveries and points the way to partial solution of the problem. Relative resistance or susceptibility to fowl paralysis has been definitely established as a genetic characteristic of certain families of birds within a breed. Unfortunately, this characteristic can not be detected at the present time except by actual progeny tests. These genetic variabilities, amounting to as much as 35 percent difference in mortality between resistant and susceptible families, have been shown to exist both by the U. S. Regional Laboratory under ultra sanitary conditions and by Hutt and Cole from Cornell in a naturally exposed environment.

Advance in developing resistant strains of birds needs painstaking work over a period of years. But breeding centers of known resistant strains are a distinct possibility in the future. For the present, the maintenance of a closed flock with a minimum of importation has proved most effective in keeping the losses from fowl paralysis in check.

The closed flock system entails constant culling of birds showing suspicious symptoms, postmortem inspection of all birds lost on range and in the laying house, and, particularly, breeding from two year-old survivors. Many flock owners who have known the ravages of fowl paralysis in the past state that following this system has brought them to the point where fowl paralysis is no longer bothersome. Newcomers in the poultry business can not do better than buy stock from breeders who keep the disease in check by the known control measures. Still the performance of a certain stock in a new environment is unpredictable on account of variable degrees of exposure to the infection. What may appear to be resistant may actually be susceptible stock that was not uniformly or intensely exposed to the infection. Thus until science comes up with some concrete control measures, the best bet for the practical poultry breeder is to know and weigh his flock as to the leukosis status and then act accordingly.

# Controlling Canada Thistle with 2,4-D

Condensed from Iowa Farm Science

*Dr. A. L. Bakke**
Iowa Agricultural Experiment Station

CANADA thistle is resistant to 2,4-D. Many farmers using 2,4-D have killed the tops only to see new shoots come up from the roots.

Ordinary applications of the ester, amine salt or sodium salt fail to give complete control—even a single treatment at a rate as high as 20 lbs. of acid per acre is not effective.

But tests made during the past 4 years have shown that repeated applications of 2,4-D will eradicate the thistle.

An application of 2,4-D, when the thistles are in the bud stage and most susceptible, will destroy the tops and many of the roots. For the best concentration, it's sufficient to use 1 lb. of 2,4-D per acre. That means about 2 teaspoonfuls of ester per gallon.

Mowing at the bud stage, followed by 2 applications of 2,4-D the next year, has reduced old stands of thistle by more than 90 percent. Applications during the early bud stage halt growth. Seed won't form. But it's still at least a 2-year proposition.

In small grain, it's best to use an application of 1 pt. (1/3 lb.) per acre of an ester type of 2,4-D. However, you can expect some damage to the crop if the thistles are sprayed in the early bud stage. But the damage may not be nearly so great as might occur if you let the thistles grow.

You can spray thistles in corn around the middle of June using 1 pt. per acre of an ester type 2,4-D to kill the above-ground parts. This concentration will not hurt the corn. Use drop nozzles to keep the spray from coming into direct contact with the growing corn shoots. And, with high clearance equipment, it's possible to make a second application in September.

In non-crop areas, you can increase the amount of 2,4-D up to 1 qt. per acre for best results. But there's no point in using more than that.

Where soil sterilization isn't important and if you want to com-

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plete the job in 1 season, you can use sodium chlorate. Apply it at the rate of 4 lbs. per sq. rd. Usually 1 application will reduce the stand about 90 percent. If a second application is made, it won't take as much solution as the first. The first treatment should be given near the middle of June and the second early in September. Make sure that all leaves are thoroughly wet with solution.

Here are some examples of the results we found in our tests with 2,4-D:

In northern Iowa, we gave thistles 2 sprayings in 1 season in pasture land. The thistle stand was reduced 70 percent. Mowing prior to blossoming, followed by a single spraying in September, cut the thistle stand 40-50 percent.

The next year, we gave 2 more applications to the thistles treated the fall before and reduced the stand almost 95 percent!

We sprayed Canada thistles growing in oats when the oats were in the milk stage and again in the stubble. Result—a 90 percent cut in the thistle stand.

At another location, we treated a heavy stand of thistle early in July when the thistles were still in the bud stage. We plowed the area 4 weeks later. Up to November, there was no aerial growth.

So, although Canada thistle is resistant to 2,4-D, it is a spray which can be used effectively if you keep at it. And, as we've said, sodium chlorate may be useful where soil sterilization isn't important.

## Wool Weighs More When Sheep Get Oats

**How would you like to trade 14 pounds of oats for 1½ pounds of wool? That's the bargain Bob Myers of Lapeer County, Mich., got last spring.**

**He sorted out the first 25 ewes he came to in his flock of 185, and fed them two-thirds of a pound of oats a day for five weeks before shearing. Their fleeces averaged 1½ pounds more than the others.**

**The shearer says most of the extra fleece weight came from extra oil. At least, even though he wasn't told which sheep he was shearing, he picked out 20 of the 25 ewes that got the oats.**

**The sheep had come off short fall pasture, but they had all the mixed hay they wanted during the winter.**

*—Farm Journal*

# Six Mistakes That Cause Wet Litter

Condensed from Poultry Tribune

*Carl O. Dossin*
Pennsylvania State College

WET litter is the number one problem for many poultrymen during the winter months.

It is usually more serious in uninsulated houses than in well insulated houses with an adequate ventilation system. In Pennsylvania, it is also more of a problem in houses with board floors built up off the ground on posts, than in houses with concrete floors.

Regardless of the type of house construction, when wet litter is a problem, the ventilation system usually is blamed. In many cases, however, management may be to blame. Faulty management practices can make it very difficult for even the best ventilation system to work satisfactorily.

Cold air cannot carry as much moisture as warm air. Therefore, you should eliminate all causes of excess moisture in the house during the winter months in order not to put too much of a burden on your ventilation system.

One of the more common causes of excess moisture in laying houses is a faulty drinking fountain. If the litter is wet around the fountain, it is either because the fountain is leaking or the birds are throwing water.

If the birds can get their wattles wet in the water while drinking, they will shake their heads when they raise them and throw off the excess. When the litter is wet around the fountain, watch the birds as they drink to see how much water they are throwing.

Sometimes this condition can be corrected by lowering the level of the water in the fountain. This is particularly true in long narrow troughs. Adjusting the height or the location of the perch around the fountain may also help to eliminate this problem. Some poultrymen have set their fountains on wire frames over metal pans to catch some of the excess water. Other poultrymen who have had wet litter around their fountains have corrected the condition by replacing their fountains with a more satisfactory type.

Overcrowding is another cause

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Mt. Morris, Illinois, September, 1949

of wet litter. Poultrymen with light breeds similar to Leghorns should plan a minimum of three square feet of floor space per bird and at least four square feet for birds of the larger breeds in large rooms. In small pens, more floor space per bird is required.

My observation in the field indicates that finely pulverized litter several inches deep covering approximately three square feet of floor space is sufficient to dry up the voidings from a bird of the smaller breeds. When houses are crowded beyond that point in the winter, the litter usually cannot absorb the additional moisture.

Sometimes, however, the birds do not spread evenly over the floor. They may use only the front half of the house because the rear of the house is too dark. Then again, if all the feeders are kept in the front of the house, the birds will spend most of their time there, thus overcrowding that section.

A more uniform distribution of the voidings in the house may help in overcoming damp litter problems in such houses. Windows in the rear wall of the house and rearranging some of the feeders have encouraged the birds to spread more evenly throughout the house in some instances we have seen. This has overcome the crowded conditions which formerly existed in the front half.

Some poultrymen tell us that the litter in one end of the pen is damper. Frequently the damp spot is near the door where the attendant enters to feed. This happens more often when the attendant doesn't always feed on time. The birds know about the time that they should be fed so they will wait at the door for him. If he is late, then the birds have so much longer to wait and pass more of their voidings in the area where they congregate.

In some of the larger multiple-story houses, the owners have stairs at each end so that they can alternate their feeding route. In houses with feed storage bins on the top floor and chutes to each floor, it's easy to vary the feeding route. When this practice is followed, the birds are less likely to wait in front of any particular door.

Pullet flocks in heavy production will eat more feed and drink more water than flocks in low production. On many farms there are several different poultry houses. Many of the newer houses are better constructed and insulated. If you have some old birds to carry through the winter and have a choice of pens in which to house them, put them in the building in which you have the most trouble from wet litter.

If the old birds are kept for market eggs only, they probably

will not be in full production until after the period when the most trouble from wet litter usually occurs. Old birds not in heavy production do not eat as much feed and drink as much water. As a result, they pass less voidings so will put less burden on the ventilating system.

Opening the curtains or windows too far the first thing in the morning has aggravated the damp litter problem on some farms. If the house has been fairly well closed up at night, there will be a difference between the temperature of the air in the pen and the outside temperature. If the windows are opened too wide the first thing in the morning, the cold outside air rushing into the pen will chill the air in the house, causing the moisture in the air to settle out. Make all adjustments of the windows or curtains gradually to avoid chilling the air in the pen too rapidly.

Some poultrymen with insulated buildings equipped with satisfactory ventilation systems do not find it necessary to adjust the windows very much during the winter months. When cold weather settles in during early winter, the window opening is adjusted to that point which has proven satisfactory during other winters and left that way until spring.

There are some poultrymen who have not had success with a built-up litter program. This litter program is one in which poultrymen put a small amount of litter in the laying pen in the late summer or early fall. As this is broken into small pieces, more litter is added and the house is not cleaned all winter. The layer of finely broken up litter and droppings serves as insulation. The warmer air in the pen cannot come in contact with the cold floor, causing the moisture in it to condense and settle out.

If the built-up litter program has not been working, check the management suggestions already mentioned. Then, too, sometimes it has not been successful because the program was started too late in the fall. To be effective there should be at least four to five inches of finely broken up material covering the floor before cold weather arrives. If long straw is added too rapidly, that is, before the litter already in the pen is pulverized, the program may not be successful. Straw will absorb moisture only through its broken edges. The finer the straw is broken the more moisture it can absorb. It is for that reason that some poultrymen use chopped straw for litter.

# Frostguard—A New Invention

Condensed from New England Homestead

*Raymond Schuessler*

OUR entire agricultural system may shortly be changed by a new invention that will lengthen the growing and harvesting seasons from four to six weeks.

The Frostguard invented by the scientists at Michigan State College gives promise of finally doing something about the weather which so many farmers have complained about for centuries. Working night and day for the last two years, after a disastrous frost destroyed Michigan's $20,000,000 peach crop in a single night back in 1946, Arthur W. Farrell and his colleagues finally perfected the machine which very likely will prevent the half billion dollar loss which farmers take on their rubicund proboscis each year.

Not only is the danger of frost dispelled, but the seasons themselves can be lengthened. In some instances and states, two crops a year can be expected. John Grimes of Plymouth, Michigan, reports: "I was the first one with Michigan tomatoes on the Detroit Market and I got $12.00 a bushel instead of the usual $3.00 I received last year.

"I planted two acres on May 11th and protected them from frost three times, once down to 26 degrees. The plants were the most prolific I have ever seen. I counted 53 healthy tomatoes on one plant."

Grimes said he planted 6,000 more plants in July and harvested a second crop by protecting the plants against September and October frosts. There are many other cases in which growers have been able to get crops in as much as 30 days ahead of normal schedule, thereby taking advantage of the high prices paid for earlier crops.

Hundreds of tests have been carried on by college officials in 11 states without a single failure. It has proven its success for low lying crops, such as strawberries, cranberries, tomatoes, currants and various types of vegetables. And also for deciduous fruit trees, such as apples, cherries, peaches and pears.

Florists too have found the machine a godsend. In 1947 the Smoke Brothers Nursery in Michigan lost 2 acres of azaleas worth $25,000 from frost. This year they put out 30,000 carnation plants

Reprinted by permission from the New England Homestead
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four weeks ahead of time, protecting them during cold spells with the Frostguard and expect not to lose a single petal.

The invention was evolved after two years of scientific experimentation at Michigan's State Agricultural Engineering Department. Everyone knew that frost occurs when the temperature is near the freezing point and the air is stilled, which allows the heat from the earth and the plants to escape into outer space, leaving the plants no way of keeping warm. But no one could find any way to block the radiation. Smudge pots, wind machines, water sprayers and even helicopters had all proved unsatisfactory. Professor Farrell finally surmised that only something that would generate heat waves of the same nature that the plants were throwing off, would solve the problem. Further experimentation revealed that the most effective substitute to plant life, for the sun's protective rays, was the infra-red ray to which the chlorophyll in the plants is extremely susceptible. These rays have properties unlike the ordinary heat waves. When they hit an object in their path, they warm it directly without losing any of their heat to the surrounding atmosphere. Because of their penetrating power, these waves were found to heat immediately from the inside.

So the first experiment was conducted with a group of infra-red ray lamps set out on a frosty night. Thermometers were placed about the vicinity, into the ground and attached to plants. In the morning it was found that although the air surrounding the plants was 24 degrees and water had frozen solid in a nearby dish, the soil and plants registered 35 degrees!

Unlike many heating principles, infra-red energy does not appreciably heat the air through which it passes, but travels in waves until it strikes the plants, trees or other objects to be warmed.

For commercial use, however, it was necessary that some sort of apparatus be developed that would sell for a reasonable price. An infra-red ray lamp would be impractical for it would run into thousands of dollars. Further experiment proved that if metal were heated to a non-incandescent glow, 1500 degrees, enough concentrations of infra-red rays would be produced. So the machine was built out of sheet steel heated by oil. The first model was a grotesque flanged thing which proved more elaborate than effective. Trial by error led to the present shape, which is now in mass production.

In simple terms, the Frostguard is a generator for producing heat energy, transforming this energy into infra-red rays and distributing the rays over a certain protected area. When directed towards the earth, they tend to

compensate for the loss of heat from the earth due to radiation.

The Frostguard stands on a strip of steel pipe which can be adjusted to protect 20 foot fruit trees or ground hugging berries. Rising from this is a chimney, a hollow tube of sheet steel. And topping the chimney is a shiny, pie-shaped reflector which directs the rays out and down to cover the required area. At the bottom is an oil burner fed by a simple pump, powered by a storage battery. A small motor pumps the kerosene from a barrel into the burners in the machine, and the heat is radiated from aluminum reflectors. Each machine costs $350 and approximately 75c an hour to run, burning from 8 to 10 gallons of kerosene per hour when in operation. Each unit protects about an acre of crops when used in groups.

There is no complicated operation. When frost threatens, the frigid scare-crow is dragged out of the barn, assembled and a match applied to the pump. The citrus growers who suffer such a heavy toll each year from only a single night of frost, are the most grateful of the farmers now that the Frostguard has been proven a success. The old smudge pot which ineffectually tried to heat the whole outdoors besides leaving an oily residue on the fruit has now become obsolete.

Many agriculturists have praised the unit as the greatest invention since the plow. It certainly is a milestone in agricultural history. By fighting frost and lengthening the growing season, both farmer and consumer will feel the effects of its economy.

# Hawaii Produces Cortisone Plant

Condensed from the New York Times

*William L. Laurence*

THE African plant, Strophanthus sarmentosus, the seed of which is a potentially unlimited source of raw material for cortisone, the rare chemical that promises new life for millions of sufferers from arthritis, rheumatic fever and some other crippling chronic ills, is growing in Hawaii, it was learned here.

Three species of the African plant, including the sarmentosus, were transplanted in Hawaii seventeen years ago by Dr. H. L. Lyon, director emeritus of the Hawaiian Sugar Planters Association Experiment Station. The other two species are Strophanthus gratus and Strophanthus dichotomus.

So far the seed of the sarmentosus species is the only one known to yield the substance named sarmentogenin, found by chemists to be nearer in its chemical structure to cortisone than any other plant substance known, including the Mexican yam product. An expedition to obtain a collection of sarmentosus seeds, cuttings and entire plants has recently been sent to Africa under the direction of President Truman as the initial step in a long-range project aimed to determine the feasibility of large-scale transplantation of the now relatively rare plant to American soil.

The Government-sponsored expedition left early last month for Liberia under the auspices of the United States Public Health Service and the Department of Agriculture. In announcing the expedition, Federal Security Administrator Oscar R. Ewing said that the project "may be to chemistry what the atomic bomb was to physics" and that he requested the Budget Bureau for an appropriation of $1,750,000 to carry out investigations on plants as possible sources of cortisone and other hormones.

The fact that sarmentosus and other species of Strophanthus can be grown in Hawaii provides the first important answer to one of the most vital questions for which scientists are seeking the answer—namely, whether the sarmentosus plant can be successfully transplanted to American soil.

Since three species of Strophanthus have been growing well and apparently thriving in Hawaii for

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Times Square, New York, September 11, 1949

several years, indicating adaptability to local climatic conditions, the chances appear to be good that the species could be raised successfully not only in Hawaii but also in other tropical, or even semi-tropical, areas within the United States and South America, including Florida, California, the Pacific islands, Venezuela and Brazil.

Dr. Lyon, according to the Honolulu report, is now in communication with other scientists working on the problem to interchange ideas and materials. Efforts are being made by scientists of the Hawaii Sugar Planters Association to grow plants from cuttings, thereby greatly increasing the production of new plants. Additional study will be required on the pollination of the plant, Dr. Lyon said.

While botogenin, a substance isolated from the Mexican yam, also holds promise as a starting material for cortisone, it is farther removed in its chemical structure from cortisone than sarmentogenin, the substance yielded by the seed of the sarmentosus plant. Both botogenin and the bile acid from which cortisone is presently synthesized in very small quantities have a vital oxygen atom at position No. 12 in the complicated "ring" structure of their molecules, whereas cortisone, as well as sarmentogenin, both have the vital oxygen atom at position No. 11.

It now takes seventeen complicated chemical steps to shift the oxygen atom from position No. 12 to position No. 11 in synthesizing cortisone from the bile acid. Hence, unless new chemical procedures greatly simplifying the process are developed, it would be considerably more difficult, and hence much less economical, to produce cortisone from the Mexican yam than from the sarmentosus seed.

It must be emphasized, however, that only a few specimens of the sarmentosus plant are now growing in Hawaii, and that at least five years must pass from the time it is planted to bear seed. It is estimated that it would take about a ton of seed to supply the cortisone needs of one arthritic patient a year, so that millions of tons will be needed to supply the expected demand. This may take years of large-scale cultivation.

# Importance of Grass in British Agriculture

*W. D. Hay*
Grassland Development Officer, British Ministry of Agriculture

THE history of the grass crop in the United Kingdom is a very interesting one. In the north of Britain ley or grassland farming has been practised for generations, whereas in the south permanent pasture with definite areas set aside for tillage crops was the rule. The tenant farmer was not altogether responsible for this state of affairs. In the south he could not plough up a permanent pasture, unless specific permission from the landlord was granted, without incurring a penalty. In the north, however, a similar penalty was exacted if a pasture was left down for more than a stated number of years, commonly three or four.

These systems, especially that in the south, dictated a rather rigid type of farming with little scope for the progressive and ambitious farmer.

All this was altered during the second World War when it was recognized that to get increased production many old, moribund, permanent pastures had to be ploughed up to provide the necessary extra food required. Between the two world wars there was available for farmers an unlimited supply of concentrated feeding stuffs at a very low price, consequently grassland was not looked upon by the majority of farmers as a potentially important source of foods for livestock.

Nevertheless, even then a few farmers in permanent pasture areas used the temporary ley as the center of their farming policy and fully realized its potentialities. During the war, especially in its early stages, the emphasis was on tillage crops—wheat was the most important, closely followed by potatoes—and milk, with the resultant unbalanced "systems" of farming. This was a policy, which, despite the high peak of production reached in 1943, could not be sustained because it was in contradiction to the rules of good husbandry, and its dependence on external pools of casual labor, machinery, and contract work.

### *Sound Husbandry*

After the war the emphasis was on sound husbandry, and so it is today. This means balanced farming, giving livestock the prominence they deserve, together with the necessary amount of tillage crops. Owing to the post-war difficulties with which Britain was faced an expansion program in agriculture was announced in the

autumn of 1947. Farmers were asked to increase their production by some 50 per cent over the prewar (1939) figures. An improvement in livestock—greater dependence on home grown feeding stuffs, increased acreage of foods for human consumption, wheat, potatoes, sugar beet, etc., were the principle points in the program.

Obviously if Britain's livestock were to be increased they had to be fed, and that on a much reduced amount of imported feeding stuffs. Approximately 8¾ million tons were imported in 1939 as compared with 2½ million tons in 1948.

Where then were the feeding stuffs to come from? It has been recognized for many years that grass, if properly treated, is able in itself to carry a very much larger head of stock than even the most optimistic had previously imagined. Here then was the answer on Britain's own doorstep; properly treated grass, an extended grazing season, better conservation of the summer flush for winter feed, together with such crops as linseed, lucerne, kale, and various forage crops.

An apt slogan has been used in this expansion program—"Fertilize the best and plough up the worst." This means that some of the best permanent pastures in the United Kingdom will fit into the farming program, but if this is to succeed a great extension of ley farming must take place.

What are the advantages of ley farming?

1) It gives a flexibility to farming that no other system can emulate.

2) Produces an enormous amount of high class clean and nutritious food.

3) Restores fertility.

4) Gives over-cropped land a welcome rest.

*Ley Farming*

The terms used for this system are many: ley farming, alternate husbandry, the three year ley system (meaning that the ley should remain down for at least three years) are a few of the terms, and, as a Scottish farmer called it "Just farming"! It is recognized now that the ley is a crop just as are wheat and kale, and to grow the maximum crop the rules are similar. If a farmer wishes to grow a good crop of wheat he must observe certain rules which are:—

1) Thorough and sound cultivations. 2) Adequate manuring. 3) Good seed. 4) First-class after management.

Exactly the same rules apply to the ley; neglect any one and the result cannot be maximum production.

How does the ley fit into the farming system? The place of ley in the rotation is well known in many parts of the British Isles,

especially on poorer lands and hill farms. It is not, however, accepted on many farms and the question "does it pay?" often arises.

Wylie, an agricultural economist at Wye College in Kent, finds difficulty in apportioning the degree of profitableness that rotation grasses play in the economy of the farm—he goes on to say, however:

"It has been emphasized several times in these reports that rotation pastures on the College farms have come to be regarded as the foundation of the whole farm economy and this conclusion is not based upon the financial results from any one section but from the farm as a whole. It has been shown that substantial profits have been made on the arable land crops, the dairy stock and the breeding flocks, and there is nothing illogical in saying that these profits are founded on the rotation grass despite the fact that the direct profits on that section of the farms cannot be computed. Success in farming is still, and always will be, partly a matter of sound judgment in planning a system that will yield satisfactory total profits, and it is in forming that judgment that analytical accounts can be helpful; but no accounts, however detailed and however accurate, can take the place of sound judgment."

*Rotation Ley*

There can be no rotation that will be suitable for all types of farmers and farms, but a modified system of that practised in many parts of England, Wales, and Scotland for many years should suit most cases. The system, with variations, is:—

Year 1 Cereals undersown (or direct seeding), years 2, 3 and 4 Ley, year 5 Cereals, and year 6 Roots.

In some cases the ley might be cut down to two years, or one, or extended to eight or more years, the latter in more intractable districts.

The length of ley is important and it is difficult to say how long it should stay down; it is generally accepted that under ordinary conditions productivity tends to fall from the fourth year onwards.

In travelling through Britain during the last year I have been greatly impressed with the progress made in improved grassland farming. Many farmers are applying the knowledge gained during the last decade and are producing increased quantities of meat and milk together with the very necessary tillage crops.

It is not unusual to find farmers aiming at a cow per acre with only the minimum help in imported feeding stuffs. Some have more than doubled production per acre and if progress is maintained there seems to be no reason why the British farmer should not only obtain a 50 per cent increase in production but exceed it.

# Moon Blindness Preventable

The Horse Association of America

Moon blindness (periodic ophthalmia) need no longer cause blindness among horses. It can be prevented by sound feeding methods.

This is the definite conclusion arrived at by experienced horsemen after six years of observation of the effect of riboflavin, which is found in abundance in leguminous pastures and in choice legume hays and oat hay. It is also available in crystalline form and in a riboflavin mixture suitable for ready feeding to horses that are not on the choice pastures and choice hays which are the first line of defense.

Noted breeders and trainers who in the past, occasionally had valuable horses go blind with periodic ophthalmia, claim that they have never had a case since improving pastures, securing choicer, greener more leafy hays, and feeding riboflavin when animals are not on pasture.

Moon blindness has been known for more than 1600 years in Europe, and for more than 200 years in America. It was long thought to be contagious or infectious, but extensive work done at the Kentucky Agricultural Experiment Station reported in Bulletin #512, established the fact that periodic ophthalmia was not transmitted from affected to normal animals, either by normal exposure or by direct injection of material from affected eyes into healthy eyes. All attempts to isolate a microorganism or virus in the eyes of horses affected with periodic ophthalmia failed.

All the offspring obtained by breeding affected animals during the course of the experiment, had normal eyes at birth, and did not develop periodic ophthalmia throughout the period of observation.

The work which established the role of riboflavin as an effective preventive was started in 1943 at the Aleshire Quartermaster Depot (Remount), Front Royal, Va. and continued during 1945, 1946, and 1947. Horses receiving 40 milligrams of crystalline riboflavin daily did not develop moon blindness, while those that did not, continued to develop the trouble at the rate of 110 animals per thousand.

The trouble had long been observed at the Front Royal Remount Depot; in fact from 1920

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417 S. Dearborn St., Chicago, Illinois

down to 1943 cases constantly appeared among the animals bred and raised at that depot. Even two year olds were affected.

The soil at this particular remount depot was poor, measured by Kentucky or mid-west standards, and legumes were virtually unknown in the pastures. Little legume hay had been fed.

Without going into further details, it is sufficient to say that the feeding of riboflavin prevented the occurrence of any further cases, though it did not cure any animals that had moon blindness at the time the feeding of riboflavin was begun.

Subsequent work in 1945 at St. Emma's Military Institute, Rock Castle, Va., where there had been a severe outbreak of periodic ophthalmia, gave similar results. At this place, 25 out of 93 horses were affected with the trouble, which was particularly critical among the two year olds, where 14 out of 19 animals were affected. Examination of the hays fed disclosed that they were very low in riboflavin.

All affected animals were removed, and the others not yet affected were fed riboflavin in addition to the diet they had been receiving. No further cases developed.

The Horse Association of America early in 1946 gave wide publicity to riboflavin as a preventive—not a cure—for periodic ophthalmia, releasing the information through the agricultural press and directly to about 25,000 breeders.

The best way to obtain riboflavin is to build up pasture and hay lands with requisite amounts of lime, phosphorus, potash and barnyard manure, till it is so fertile that legumes grow in abundance with the grasses. Horses grazing on lush pastures that are 40 or 50 per cent legumes, need no crystalline riboflavin as a supplement; but when pastures become dry and grain and hay must be fed, it is wise to feed 40 milligrams of riboflavin daily with the grain. Merck's riboflavin concentrate, in which the crystalline riboflavin is mixed with starch to give it bulk and make it easier to feed, is available from Vitamin Concentrates, Division of Supplemental Foods, Inc., 306 Plymouth Building, Des Moines, Iowa, at moderate cost. One-half of a level teaspoonful per day supplies the 40 milligrams, sufficient to protect a horse against moon blindness. It should be fed to mares in foal, to foals and to all other valuable horses of all ages, except when they are out on lush pastures containing an abundance of legumes.

Choice, green, leafy mixed hays containing 50% or more of clovers or alfalfa, or especially choice oat hay, are high in available riboflavin, and when they are fed, the crystalline riboflavin or riboflavin

mixture will hardly be needed; though with very valuable horses, it is wise insurance to feed it even when the choice hays mentioned above are available and being used.

An adequate amount of riboflavin must be fed daily in some form, as it is not stored in the body. If crystalline riboflavin is used, feed only 40 milligrams per horse per day in the grain.

Riboflavin is not a cure for periodic ophthalmia. No cure is yet known. It is a protective feed, to be fed if natural sources of riboflavin are not abundant.

## Ladino Clover Makes Best Pasture

Condensed from Southern Planter

*Gene Smith Moody*
Virginia Polytechnic Institute

LADINO clover is wearing the emerald crown "Queen of Pasture Plants" in Virginia. Fields that were mostly broomsedge, bramble briars, and poverty grass a few years ago, now are emerald green with Ladino and grass mixtures. They are pushing milk and beef production skyhigh. And, as on the farm of A. R. Butler, Jr., near Carrsville in Isle of Wight County, are cutting feed costs by as much as two-thirds.

Butler seeded his first Ladino-grass pasture in September, 1945. In 1946, 40 cows grazed on 10 acres from March until frost, switching over to another field for four or five days every two or three weeks.

At time of seeding he applied 1,500 pounds of lime, and 700 pounds of 3-12-6 fertilizer. In 1948, Butler upped his pasturage to 24 acres, applied one-half ton of lime per acre and top-dressed with 800 pounds of 2-12-12 fertilizer. Each spring he has applied 10 tons of manure and 600 pounds of complete fertilizer. He says, "I clip it when I fertilize, take the cows off for eight days, and it's ready to graze again."

He is a firm believer in rotation grazing. "In 1948, I grazed 65 cows on 24 acres divided into three cuts, let them eat one cut down, and then put them in another cut. Now I have my 24 acres of Ladino clover divided into five cuts."

Butler claims that "on good

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Ladino clover cows will give about one-third more milk than on ordinary grass pasture—and with less barn feed . . . It's a life-saver to dairymen in this section of the country. If you take care of it, and give it plenty of fertilizer, there's no telling how many cows it will take care of."

In Greensville County, another farmer has had similar experience with the profit-boosting Ladino. A few years ago, E. T. Allen of Emporia, had 10 acres of wet, sandy land, which did nothing much but take up space. The last time he planted it in corn, he didn't even get his seed back.

In October, 1948, Allen seeded the piece with a mixture of 2 pounds of Ladino and 10 pounds of orchard grass. He applied one ton of lime and 1,200 pounds of 2-12-12 fertilizer per acre. Even though he seeded late, by December it was "shoe-top" high, and he put 120 medium-sized pigs and eight cows on the 10-acre pasture. It carried them until February. Then in March he put 70 larger hogs on the 10 acres, and, says Farmer Allen, "they couldn't keep it down." He says hogs grew faster with one-half the feed.

"It is much easier to stand in the shade and watch your hogs graze than it is to follow a mule or ride a tractor in a peanut or cotton field . . . I was getting about $150 an acre from cotton and peanuts, and I am getting more than that from pasture. If I had enough stock to keep it grazed off, it would pay me $300 an acre," Allen said.

Lush growths of Ladino and orchard grass on the Halifax County farm of N. H. Wooding have increased the average daily milk flow by 10 gallons. Since the last of March, he had continuously pastured about 28 head of cattle on 8½ acres. Here again, plenty of lime and fertilizer get part credit.

Southwest Virginia farmers also are finding the Ladino-orchard grass pasture a boon to milk production.

On the Montgomery County farm of John Conduff, 4½ acres are credited with cutting the feed bills for 28 Holstein dairy cattle by $75 per month. Conduff turned his cattle on the pasture in mid-April, and in early July they were still going strong. Add to this about a ton of hay per acre, mowed when Conduff decided the orchard grass was getting too coarse for pasture.

In tests at the Eastern Virginia Field Station at Williamburg, Ladino yielded over a ton more per acre than any of three other white clovers. One test plot of a Ladino-grass mixture gave yields of five to six tons per acre of air-dried hay. This means that such a mixture can yield about 20 to 25 tons of green pasture herbage per acre.

Other tests at Charlotte Court House gave agronomists these

clues to profitable Ladino production.

September is the ideal seeding month for Southside Virginia. August seedlings are satisfactory, if there is enough moisture. March is the best month for spring seeding. April seedings have too much weed trouble. Ladino should be seeded on a compact seed bed. With proper fertilization and methods of planting, fair stands of Ladino can be obtained the first year from a seeding of as little as one-half pound per acre. One pound, when properly seeded, gives a full stand. However, for the average farmer, two pounds of Ladino seeded with 8 to 10 pounds of orchard grass is a safer bet. Ladino which is clipped closely and continuously is soon killed, and grasses and weeds take over. Rotational grazing must be followed.

Virginia's agronomists explain that the maximum number of days of grazing are not possible with one pasture field. A system of pastures must be developed, using mixtures which give high yields at different periods of the year.

For instance, sweet Sudan grass, alfalfa or red clover may be used as temporary grazing during drought periods. A mixture of small grains, rye grass, and crimson clover may be used during the winter months when the regular permanent pastures do not provide grazing.

## Planting New Orchards

Condensed from the Rural New Yorker

*Clarence E. Baker*

FRUIT growing is a business that should be entered into only after a thorough study of the many factors involved. To establish a planting of fruit trees requires considerable capital investment and little income can be expected for several years.

The first step in the development of a profitable orchard is the selection of a favorable site. Little can be done in future years to overcome the adverse features of a poor location. Even for the small number of trees that may be desired for a home orchard, there often is considerable choice as to their location. Poor selection of the

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site has been a common cause of failure in apple and stone fruit culture in this country. Such unwise investments of capital could have been largely prevented by more careful forethought.

Probably the first consideration in selecting the site should be that of avoiding locations likely to be subject to Spring frosts. Many orchards that might otherwise be profitable have their blossoms killed by Spring frosts so frequently that little fruit is produced. In some seasons Spring freezes of sufficient severity occur so that blossoms in even the most favorable locations are killed. Little can be done about this, but much can be done to avoid frost pockets and locations where cold air collects on only moderately cold nights.

In selecting the site most likely to be frost free, it must be remembered that air behaves quite like water. Warm air rises and cold air settles, as cold air is heavier than warm air. Thus the cold air settles near the ground and, like water, tends to move by gravity to the lower levels. Depressions in the surrounding landscape become filled with cold air while the higher locations remain comparatively warm. If large openings, such as a river valley, are available for air drainage, the heavier, colder air flows into them until they are filled, thus draining away huge masses of cold air from higher levels. This is why many favorable orchard sites are located on plateaus or gentle slopes above such valleys.

The ideal orchard site, therefore, is one that has considerable elevation above wide adjacent areas of lower ground, capable of carrying away large masses of cold air. The site itself should be as level as possible in order to avoid soil losses from erosion. Rollings areas or hillsides should be contour planted or terraced if used for orchards. This is necessary both to save the soil by reducing erosion losses and to conserve moisture by checking the natural run-off of surface water thus encouraging the rain water to penetrate into the soil for future use.

The selection of good orchard soil also is a primary consideration in choosing the location. If trees are set on a soil not suited to their growth, it is useless to hope for a productive, long-lived orchard. Fruit trees require a deep, friable, well-drained but moisture retentive soil, with a moderate to high level of fertility. If the soil is underlain with rock or some impervious layer that restricts the depth of roots, favorable growth is unlikely. Shallow soils may be either too wet or too dry. If there is a high natural water table, or if such a condition exists at certain times of the year, root growth is interfered with. Fruit trees do not like wet feet and, when water

stands about tree roots for considerable periods, the roots die from lack of oxygen. On the other hand, shallow soils, low in organic matter, that do not store sufficient moisture to carry the tree over extended dry periods, are not desirable.

The ideal orchard soil is sufficiently deep and open to permit adequate drainage and unrestricted root growth and contains a favorable supply of organic matter and the nutrient elements necessary for optimum growth of vigorous trees. Avoid eroded areas where the fertile top soil has been washed down the river, or overcropped land whose natural supply of humus and nutrient elements has been exhausted. Avoid, also, any areas upon which water stands for unusually long periods after a rain, or any locations known to be poorly drained or unfavorable for the growth of other crops.

Another important stone in the foundation of a profitable orchard is the selection of proper varieties for the location under consideration. Many fruit varieties are quite limited in their geographical adaptations, others have much wider ranges. Before choosing the varieties that are to make up the planting, the orchardist should be sure that they are likely to do well in his location. Poor selection of varieties has been the cause of many unprofitable orchards. However, this is not such a fatal mistake as the selection of an improper site or soil, as unprofitable varieties may be worked over into more desirable ones. But this is a tedious, expensive and time-consuming process.

New varieties with no history to serve as a background should be planted sparingly until their merits are established unless, of course, the orchardist has enough gambler's blood to get a thrill from a venture that may turn out badly. If a commercial enterprise is being considered, the suitability of the varieties to the type of marketing contemplated, their keeping quality and consumer demand are important factors. In the home garden the prime consideration may be the varietal preferences of the family.

The investigation of blooming dates to insure possibility of pollination between varieties is also an important consideration. Some varieties require pollen from other varieties before they will set good crops of fruit. If several varieties are in bloom at the same time, bees and other insects perform this important duty when the weather is favorable for their activities. Some varieties are self-fertile and do not require pollen from another variety to insure a set of fruit. The selection of varieties without consideration of these factors has been responsible for lack of production in many or-

chards across the country. Setting large blocks of a single self-sterile variety or the use of two or more varieties that are inter-sterile is a good way to invite failure. Here again, such costly mistakes may be avoided by careful planning. Your State agricultural experiment station will be glad to help in the selection of varieties.

Methods for laying out the orchard plan are numerous. Unless the orchard is to be set on the contour or on terraces, where the distances between trees are likely to be irregular, some square or rectangular system unually is employed with the trees set in straight rows in both directions. Planting distances vary between fruits and varieties of the same fruits, and frequently with soil fertility and moisture conditions as well. Fertile soils, well supplied with moisture, can support more trees per acre than less fertile, shallow soils, if such must be used.

Apple trees are usually set from 35 feet to 40 feet apart, depending on the variety. Peaches, cherries and most plums may be set 20 to 25 feet apart. Overcrowding should be avoided in any case to permit convenient spraying and culture. Intercrops may, of course, be grown between the trees during the early years of the orchard if they are properly handled so that the normal growth of the trees is not interfered with. Mixed plantings, such as peach tree fillers in an apple orchard, are not usually recommended because of the different cultural and spraying requirements between apples and stone fruits.

Regardless of what system is followed in laying out the regularly spaced orchard, the planting of the young trees is very important. A good orchardist or home gardener sets his trees so that they are perfectly lined up in both directions. While a tree set a few inches or a foot out of position probably will grow as well as if set exactly in the proper place and while it is also true that by the time a tree is mature, the fact that it was set a few inches out of position is no longer likely to be noticed, nevertheless a carefully planted orchard is a source of pride and a mark of proficiency.

The position of each tree may be located by a small stake as determined by sighting from well established base lines at right angles to each other; or by using a surveyor's transit. When the hole for the tree is dug, the exact location of the stake may be lost and the tree may be planted several inches out of position. To insure that the tree is planted exactly in position, a planting board may be used. This is a one-inch thick strip about three inches wide and five feet long, with a notch to take a one inch by one inch stake at each end, and a similar square or V-shaped notch in the center of one side. To

operate this device, the board is laid on the ground so that the center notch is fitted about the stake which marks the first tree's location. A small stake is then placed in each end notch location. After this the board may be lifted and laid aside, leaving the two end stakes in the ground. The tree stake at center is then removed and the hole for the tree is dug in the approximate location of that stake. This hole should be well prepared, deep and wide enough to hold the roots of the tree without bending or crowding, after any broken or extra long roots have been removed or shortened.

After the hole has been prepared, the planting board is returned to its position between the end stakes, being sure the same side is up (the "up" side may be painted white or otherwise marked to avoid confusion). The tree is then placed in the hole with the trunk in the side notch of the planting board and held in this position while the soil is placed about the roots. The tree now occupies the same position as the location stake. When the planting is completed the planting board and end stakes are lifted and taken to the location for the second tree; and so on until the orchard is completely set out.

The tree should be set about an inch deeper than it stood in the nursery; this can be determined by the soil line on the trunk of the young tree. Well pulverized, mellow topsoil should be placed about the roots in filling the hole. The soil should be firmly packed to avoid air pockets but the tree roots should not be scraped or otherwise injured in this process. If strong prevailing winds from a certain direction are experienced, the young tree may be leaned in the direction from which they arise. In a few years the tree will become straight, whereas if vertical at the start, the winds may cause the tree to lean in the other direction after several years. The extent to which the tree should be leaned toward the wind at planting time depends on the severity and constancy of the wind.

Either one-year whips or two-year-old headed trees are used for setting young apple orchards. If properly headed, two-year-old trees are good. Many growers prefer to use the one-year unbranched trees so that they may form the heads themselves by selecting the scaffold branches as the tree develops. One-year-old peach trees, or "June buds," are best suited for transplants. Well grown one-year trees of plum and cherry make suitable transplanting material.

Careful consideration of these planning and planting factors will do much to insure a good start toward a productive and profitable orchard.

# Silos and Spoilage

Condensed from The Michigan Farmer

*S. T. Dexter*
Michigan State College

We do not know all the answers but many causes of silage spoilage are well established.

On the top of practically every silo we expect to find a considerable amount of rotten and moldy silage. This surface is open to the air. Where there is plenty of air, the silage heats and molds. If air is kept away from the silage, heating is greatly reduced, since most of the heating is due to the action of the mold organisms.

Mold is a plant that lives on dead organic matter, but it requires oxygen from the air to grow. There are, it is true, some molds that can live with very little oxygen, but generally speaking, where there is no oxygen, the molds can't grow. Air is about 20 per cent oxygen; the other 80 per cent is mostly inactive gas, nitrogen. Within 24 hours after ensiling, the living chopped plant cells have used practically all of the oxygen in the air that is trapped with the chopped feed. Oxygen is found in a filled silo only at the surface, or where it can leak in at cracks or holes, as is frequently the case around doors.

Since air can readily get through these small holes, molds may continue to grow until great chunks are formed near the source of air. Heating may occur, and drying out, which permits still more free circulation of air. When this occurs, great volumes of silage may be affected.

Molds produce carbon dioxide and water, destroying the acid and the food value of the silage. The carbon dioxide, a gas, escapes. The water remains, and the acid, that is necessary to preserve the silage is destroyed. Where cool areas exist, the steam from heating areas will condense, and there is frequently formed a wet, soggy, rotten layer of silage. Sometimes such a soggy area may be found next to the walls of a silo when the silage itself is actually too dry, and has heated.

When silage is too wet, the pressure in the silo will generally cause dripping, foaming and squirting of water from the silo. A good many barrels of such silo juice

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may drain out into the barn yard. Sometimes this silage will keep perfectly, although with grass silage, low in sugar, spoilage may be expected. Even in corn, it is common for such silage to be rank-smelling, and completely spoiled in the bottom several doors, where the water has accumulated. On further rotting, the silage will almost completely liquefy.

This vile-smelling silage is caused by butyric acid bacteria, which developed because the acidity of the silage was not great enough to suppress them. The butyric bacteria do not grow readily in a good acid silage, but when they do grow, they reduce the acidity already present, which often leads to complete spoilage.

All types of silos and silage seem to be affected. None of our conventional silos are completely air tight. Of course, a loosely built silo, where daylight shows between every pair of staves is almost certain to give spoilage.

Spoilage is particularly common in new silos the first year. In some cases, it is possible that the newer concrete still contains traces of lime, which would neutralize the silage acids, and lead to butyric acid fermentation next to the walls. In some cases, leaky or porous walls, which might get better as the silage juices soaked into the concrete surface and sealed it may be the cause.

Any silo needs care. The acid in silage is corrosive. Particularly subject to corrosion are the reinforcing rods. Joints should be kept tight with cement mortar, or various of the tarry compounds. A coating of cement and sand will help protect a wall—usually toward the bottom of the silo—that is beginning to show wear. No silo is acid proof. Even tile silos need attention at the joints, to save the reinforcing.

Generally speaking, spoilage, except in the case of obvious leaks and holes, as around doors, is more a matter of the condition of the silage than of the condition of the silo. Silage should be chopped fine enough and be wet enough to pack well. Dry leaves should not accumulate against the walls, as is common with frosted corn. Neither should the silage be so wet as to force liquid out of the silo. In such a case, there is grave danger of butyric acid silage.

Covering the silage, and tramping to get a tight top surface can save some surface spoilage. A layer of poor material, well soaked down may be used. New plastic covers may help, but seem a little expensive so far.

Sometimes the cause of spoilage is by no means clear. Sometimes, excessive rainfall or snow in a roofless silo causes drainage of water down through the silage, with spoilage resulting. Sometimes it

might be due to a load or 2 of over-dry silage. But in some cases, no reason for spoilage can be determined.

Since we can make good silage, loosely packed in air-tight jars, and since such jars, thrown into the silo at various levels always seem to come out in excellent condition, we can conclude that keeping the air away is the answer to most of the problems. If the silage has acid enough to keep down butyric acid fermentation, and is well-packed enough to keep the air out, good silage should usually result. Very wet, immature material tends to develop butyric acid; somewhat too dry material packs poorly and heats or molds. In a tight silo, the suitably moist silage usually gives excellent silage.

## Shipping Fever

Condensed from the Dakota Farmer

*Causes*

Q. What causes shipping fever in cattle?

A. It is generally believed to be a bacterium with the name of Pasteurella boviseptica.

Q. Where are these germs found?

A. Strange as it seems, their favorate living quarters are in the nostrils and lungs of perfectly healthy cattle.

Q. Then the germs do not always cause shipping fever?

A. Decidedly not. Cattle have to be weakened and their resistance greatly decreased before these bugs cause any trouble.

Q. What can cause such weakening?

A. Exposure and exhaustion are the most common causes. Exposure results from lack of protection against cold and stormy weather. Exhaustion is induced by long trips without resting or sufficient feed and water. Long ago it was noted that transported animals often became sick, so the disease came to be known as shipping fever.

*How It Spreads*

Q. Is the disease "catching?"

A. Extremely so. Once started, it will probably go through an entire herd in a few days, including both strong and weakened animals.

Q. How does it spread?

A. Usually through the germs being swallowed with feed and

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water, though they may evidently be breathed into the body, too. The germs are originally given off by diseased animals, of course.

Q. But how does it spread between farms?

A. Most commonly by the introduction of animals. Sometimes they are new purchases, but they are often home animals that are being returned from fairs or other exhibitions. In either case, they have picked up germs somewhere along the line and brought them along to cause trouble for an unsuspecting owner.

Q. Do these infected animals always appear sick?

A. No, indeed. They may be entirely immune to the disease, but still be carriers of dangerous germs. Another possibility is that they may be coming down with disease though not yet showing any symptoms. Such animals are said to be in the "incubation" stage and sicken in a few days after being unloaded in apparently excellent health.

Q. What is meant when you say the introduction of animals "most commonly" spreads this disease? Are there other ways in which it is spread?

A. Yes, for the germs may be carried on clothing, shoes, automobile tires, and other things as easily as in or on other cattle. Dogs, rats, pigeons, crows, flies, etc., may also act as carriers of disease.

Q. Then an outbreak of shipping fever is not dependent on the shipment of cattle in all cases?

A. Not at all. The disease may suddenly break out in stabled or pastured cattle that have not been shipped or been in contact with any that have.

*How Cattle Act*

Q. How do cattle act when they have shipping fever?

A. Just as if they had pneumonia. They breathe hard and fast, foam at the mouth, run a high temperature, and act sick in general. Food is entirely refused and milking cows dry up, with a bloody diarrhea sometimes seen. An outbreak usually starts with only one or two cows, and the rest of the herd comes down two or three days later. Most of the first animals to sicken generally die, with many slow recoveries among those that come down later.

Q. How can I be sure my cattle have shipping fever instead of something else?

A. You probably won't be able to unless you have had plenty of experience with cattle diseases of all kinds. Shipping fever may strike at any time of year and affect animals of all ages. It may be mixed up with anthrax, blackleg, coccidiosis, poisoning, and other troubles. A history of recently imported animals sometimes helps, but they may have brought in

something besides shipping fever, too. In addition, we have already seen that this disease may appear in herds where no animals have been shipped at all. Consequently, you'd better play safe and call a veterinarian right away for suspicious cases.

*What Veterinarian Does*

Q. Suppose my cows do have shipping fever. What will a veterinarian do?

A. Probably treat sick animals with serum or give them drugs like the newer sulfathiazole or sulfamerazine. Animals not yet showing symptoms will probably get serum to immunize them.

Q. Will the serum shots prevent any new cases from appearing?

A. Not always, for some of the apparently healthy animals may already be in the "incubation" stage which we mentioned earlier. Serum is not a preventive of disease in already infected animals, but it will lessen the severity of attacks.

Q. Suppose serum is given before animals have become infected. How long will they be immune to shipping fever?

A. For about two or three weeks.

Q. But they tell me that bacterins or vaccines will give immunity for a year or longer. Why not use them instead of serum when an outbreak starts on a farm?

A. For two principal reasons: It takes about 10 days for immunity to develop after the injection of bacterin or vaccine, while serum gives immediate protection when it is needed. The use of bacterin or vaccine actually seems to make cattle more susceptible to shipping fever for a few days after they are used. Thus vaccination with such agents may make an outbreak worse instead of better.

Q. Will it pay to vaccinate cattle before an outbreak starts?

A. Probably not, unless the disease is already present in the neighborhood and likely to be brought in. Otherwise, the chances are fairly good that you'll escape trouble from shipping fever.

Q. But what about animals I buy or am returning from the fairs? Maybe they'll bring the disease home with them?

A. That is true. However, rather than vaccinate all your home animals, it will be cheaper to completely isolate suspicious beasts for at least 30 days after they are brought in. They are thus prevented from exposing susceptible animals.

Q. What shall I do about animals I am sending to the fairs, or those I have purchased and am going to ship for several hundred miles? Aren't they likely to be exposed? Won't they need protection of some kind?

A. Yes, they certainly are likely to be exposed, and no less certainly

should be protected against shipping fever. In such cases we recommend that you have a veterinarian do one of two things: Give each animal a shot of bacterin or vaccine at least 10 days before it is moved or give each animal a suitable dose of serum just before and again just after shipment.

*Good Care Needed*

Q. Will anything give protection against shipping fever besides vaccination?

A. Yes, good care of animals will go a long way toward keeping them strong and healthy enough to ward off infection. Whether vaccinated or not, animals making long journeys should:

Be given well-bedded comfortable, uncrowded quarters in truck or stock car. Be either kept off the roads entirely or carefully protected against exposure and chilling during spells of bad weather. Be unloaded every eight hours for a good rest period. Be fed liberally on good rations during such rest periods. Be given free access to clean fresh water at such times.

The rules in regard to good rations, clean water, and protection against bad weather can be observed to good advantage even when animals are not being shipped.

*Disinfect Barn*

Q. Suppose I've had a previous outbreak of shipping fever on my place. Will it be safe to bring in unvaccinated animals?

A. Not unless the entire barn interior has been carefully cleaned and disinfected to kill germs that may still be present there. Even then, it will probably be better to play things safe by vaccinating new animals.

Q. What can I use for disinfecting a barn?

A. Almost any of the common disinfectants are effective, since the germs of shipping fever are not hard to kill.

Q. Will it be necessary to disinfect my barnyard, too?

A. No, for premises that are exposed to sunlight will probably be free of living shipping fever organisms within a few week's time.

# Lower Income or Increased Efficiency?

Condensed from Eastern States Cooperator

*B. D. Crossman*
University of Massachusetts

NET income of the average farmer is being pinched. Farm prices have been gradually declining from the peak reached a year ago. Total costs have not kept step; some costs have declined, others have increased, e.g. farm machinery, interest and taxes. How will farmers respond to being pinched between falling prices and lagging costs? Lower incomes will force the level of living down for some families. Others will respond to the pinch with a plan for greater farm efficiency and profit maintenance.

An actual farm in the Connecticut Valley area of Massachusetts is chosen as a basis of comparing the alternative of lower income with increased efficiency. The 63 acres are operated by a father and son, with farm earnings shared by both. Enterprises include an 18 cow dairy, an average of 600 laying hens and four acres of tobacco. Seven acres of silage corn are grown; the remainder of the cropland not used for tobacco is used for hay and pasture crops. Some young stock and dry cows are pastured off the farm. Normally no hay has been purchased. Records indicate 7500 pounds of milk per cow with grain feeding of 2500 pounds per cow. Normally a bull is kept, but artificial breeding of the better cows is being practiced. About two cows are purchased a year. Production of the poultry flock is about average while the yield of the tobacco is somewhat above the state average. Equipment is typical for a farm of this size with the exception that a homemade buck-rake has been used to harvest hay. The only extra labor is hired during tobacco harvest.

*Earnings on a Diversified Massachusetts Farm*

| | *Previous Operation* | | *New Farm Plan* |
|---|---|---|---|
| AT PRICES OF | *1948* | *Early 1949* | *Early 1949* |
| *Receipts* | | | |
| Milk ..... | $ 7,860 | $ 7,475 | $10,400 |
| Tobacco ... | 3,960 | 3,750 | 3,750 |
| Poultry Products . | 6,158 | 5,838 | 5,838 |
| Other ..... | 1,063 | 1,026 | 1,091 |
| Total Receipts . | $19,041 | $18,089 | $21,079 |
| *Expenses* | | | |
| Grain ..... | $ 6,451 | $ 6,121 | $ 6,650 |
| Dairy Stock | 650 | 625 | — |
| Baby Chicks | 200 | 190 | 190 |
| Other Expenses . | 3,715 | 3,715 | 5,200 |
| Total Expenses . | $11,016 | $10,651 | $12,040 |
| Net Cash Income or Return to Father and son partnership for their labor and interest return on owned investment. | $ 8,025 | $ 7,438 | $ 9,039 |

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The farm shows receipts of $19,041 at the prices prevailing in 1948. Expenses amounted to income $11,016 leaving a net cash farm income of $8025. Allowing an interest return on the owned investment the return to each partner for labor approximates $3600. With no change in plan of farm operation the decline in farm prices of five percent from 1948 levels would decrease the farm receipts $952. What would happen to expenses? The prices for grain, dairy cows and chicks purchased would probably drop by a similar percentage. This would reduce these expenses by $365. These cost items are farm products and less subject to the price rigidities of processed goods and wages. Processed goods including fertilizers, dairy supplies and poultry supplies will not drop a similar percentage due to the labor involved. Therefore, the slight decrease in these items to date is offset by higher taxes, interest, farm machinery costs, and increased maintenance. This leaves a total decrease in expenses of $365. When this is deducted from the loss in receipts of $952 the net income is $587 smaller than in 1948. Will this amount eliminate the plan to paint the farm buildings, or will it result in a cut in next year's fertilizer bill or will there, of necessity, be a cut in the level of the family's living?

The family on this farm is not looking forward to decreasing incomes. They have a plan already well started to maintain favorable returns despite price declines. The clearance of brush, trees and stones from 12 acres will be completed. An increase in the acreage of legume hay and pasture will follow, making it possible to raise all replacements and carry more cows. A new silo and a small type forage chopper have been recently purchased to make grass silage. To help with the investment a few days outside work will be done with the chopper. Success in allowing older young stock to run out of a shed in the winter has freed tie-ups for seven more cows. The additional cleared land and high quality roughage brought about by increased rate of legume seeding and increased fertilization will provide the same amount of milk per cow with somewhat less grain required.

Additional investment for the added dairy stock, equipment, silo and land clearance will amount to over $6000. This means more interest, taxes, repairs, upkeep and insurance. Besides these increased overhead expenses there will be increases for grain, seed, fertilizer, labor and supplies. Despite these increases, the plan undertaken shows a surprising advantage over the previous operation with a net income of $9039 at early 1949 prices (see table). A pinch may hurt or it may stir incentive.

# New Methods of Weed Control for Small Fruits

Condensed from American Fruit Grower

*R. F. Carlson*
Michigan State College

GROWERS of strawberries, raspberries, grapes, and other small fruits spend much time and money controlling weeds. The cost for an acre of strawberries for one year is about $50. Some growers, however, are finding that this annual cost can be reduced appreciably by the proper use of new chemical herbicides. If the herbicide is applied at the proper time and at the right concentration, hoeing and cultivating can be cut to a minimum.

Many of the small, tender weeds in the strawberry field can be controlled with 2,4-D. One-half pound of actual 2,4-D or one-fourth to one-half pint of a 40% solution of 2,4-D per acre should be applied two to three weeks after the plants are set or when weeds are emerging. This amount of 2,4-D may be put into as little as five to 10 gallons of water, thus making a concentrated spray which materially reduces the labor involved. Care must be taken to apply the spray evenly over the entire area at the rate per acre given, otherwise injury may result. A second application may be necessary after the berries have been cultivated. Fall application should be avoided because of the effect on the development of flower buds.

If the material is applied prior to a dry period, or if the soil is sandy and the general conditions droughty, growth of the plants will be arrested somewhat and symptoms of twisting and bending may become apparent. The plants will soon recover, however, following a rain or irrigation. Most of the weed seedlings will be killed and only the more resistant weeds and grasses will remain. These resistant weeds should be hoed out immediately to prevent them from going to seed.

Pre-planting applications of one to two pounds of actual 2,4-D per acre also have shown considerable promise. The spray is applied to the entire surface of the area to be planted a day or two before the plants are set. Care should be taken not to disturb the soil excessively when the plants are set; otherwise more weed seeds are

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Cleveland, Ohio, August, 1949

brought nearer the surface where they will germinate and grow. The planting should not be cultivated until it is necessary to loosen the soil and remove weeds that were not killed with 2,4-D.

Common chickweed is a serious weed in many commercial strawberry plantings. This weed germinates in the fall and grows and remains green all winter. Recent research has shown that IPC (Isopropyl N-phenylcarbamate) controls this weed without injuring the strawberry plants. For best results it should be applied in the fall—September through November.

IPC can be applied to the chickweed either as a dust or as a spray. In either case 10 to 15 pounds of actual IPC per acre are sufficient for control. If the material is applied as a dust it should be diluted with a carrier such as talc or spray lime to insure coverage of the desired area in accordance with the recommended rate of application. It can be applied with a mechanical duster.

When the material is applied as a spray, the wettable form of IPC should be used in 75 to 100 gallons of water per acre. Since IPC is not completely soluble, large volume nozzles are needed, and the solution should be agitated.

In raspberry plantings 2,4-D, if correctly used, will aid in controlling many of the broad-leaved weeds such as lambsquarter, pigweed, and Canada thistle. The rates of application suggested for strawberries are good also for raspberry plantings. It is important to spray when the weeds are small and before the raspberry plants have begun flowering. The nozzles should be held low and directed at the weeds at the base of the canes. Excessive amounts of 2,4-D on raspberry foliage will cause some twisting and bending of young leaves and shoots and will result in checking their development to some extent.

For control of grasses in raspberries and possibly in grapes TCA (Trichloroacetate) looks promising. This material controls grasses satisfactorily at rates of 30 to 40 pounds in 25 to 50 gallons of water per acre. Severe injury in the form of yellowing of the leaves and stunting of the plants will occur from excessive amounts of material or from applications made when the brambles are in an active stage of growth.

Late fall applications of TCA have shown the most promise to date for control of grasses. The material is applied after the old fruiting canes have been removed and the leaves have dropped from the young brambles. At this time the grass is usually still green and the raspberry plants are comparatively dormant.

In old plantings that have be-

come sod-bound TCA will be of great aid in a rejuvenation program. By eliminating the grass growth in the row, the plants will increase in vigor and can be more easily sprayed for the control of anthracnose and other diseases and insects.

## Flesh and Fat—There's a Difference

Condensed from The Shorthorn World

*Dean W. L. Blizzard*

FLESH and fat in beef cattle are not the same!

When we attempt to point out the differences and interpret them in terms of their effect on the feeder's and the breeder's business, we find ourselves reviewing a bit of history about consumers' likes and dislikes in beef.

Fifty or more years ago large, highly finished steaks and roasts were popular. Often there was a wasteful amount of fat on the cuts but this fat added some flavor and the waste was not considered too objectionable, for beef was relatively cheap in price. This situation was due, in part at least, to the fact that American families averaged larger than nowadays and the average person did some manual, outdoor labor.

Thus the feeder's main problem was how to get his cattle as large and as fat as possible. Then, as now, the breeder's efforts had to be in line with what the feeder would buy. Breeding cattle in general were of the type that would produce cattle which grew an exceedingly large frame and could be fed to weights of 1,500 pounds and upward.

Today, families average smaller, people do less physical labor, and many live in small apartments equipped with refrigerators, stoves and utensils that would not handle large cuts of meat very readily even if such were wanted.

General demand today is for steaks, roasts and other cuts that are small to medium in size and have a maximum percentage of red meat compared to bone, no excess fat and attractive color. The main consideration in color seems to be that the meat shall not be too dark.

In terms of live finished cattle,

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this means that the trend has been toward steers weighing 850 to 1,000 pounds, with less finish than was common years ago, but showing enough quality of finish so that they will produce carcasses which grade high good to choice.

The fat cattle judge appraises the cattle before him partly on the basis of thickness and evenness of covering and a firm yet springy texture in that covering. He must handle each animal to appraise properly the covering.

Here is where the difference between flesh and fat comes in!

The desirable touch comes only from a thick natural covering of red meat or muscle, spread over a tight, smooth framework, to which the feeder has added some finish. That finish produces "marbling" or interlaying of fat between the natural muscle and muscle fibers, and it also produces some outside fat. Too much outside fat, or fat alone, lacks the desired firm, springy touch.

A steer that handles soft may have gone past the stage where he should have been slaughtered. Though his muscles may be well marbled, he has laid down extra outside fat after reaching peak condition. He may have developed patchiness at the tail head or roughness over the loin.

Or, the soft touch may mean that the steer never had a maximum of natural muscling to be marbled and that almost from the start of his feeding period he laid on most of his fat on the outside.

The red meat or natural muscling is bred into an animal. These muscles grow and develop as the animal matures. Good feed and care help them develop more quickly, but all the feed and care in the world cannot add one bit to the natural muscling that the animal had when it was born. It is not possible to bring a steer up to where he will grade "choice" if he does not have natural fleshing.

Since it is the loin, crops, and rear quarters from which come the highest priced cuts, we naturally want most natural fleshing in those parts. However, there should be sufficient natural fleshing in other parts so that the steer can develop an even covering of fat. When he is slaughtered, an even covering of fat over the entire carcass prevents drying and weight shrinkage while the meat is being handled in the wholesale and retail markets.

Choice fat cattle need not be wasty. Three-quarters of an inch of outside fat may be plenty on a steer that is naturally well muscled. On the other hand, a steer may accumulate as much as 2½ inches of outside fat without reaching choice grade at any time.

When the judge looks at fat cattle he appraises general conformation along with covering.

Depth of body, uniform width, shortness of legs, symmetry, and balance are qualities that indicate a carcass, which among other things, is well muscled.

Looseness and pliability of the hide also are related to carcass quality. A loose hide indicates that the circulation is adequate and that all the tissues of the body are properly nourished. Someone has said that the hide should fit like a comfortable overcoat.

The general clean-cut appearance of the head, trimness, and refinement throughout the body also help indicate the quality of the meat.

Royal Jupiter, the 1946 International grand champion steer, was one of many Shorthorns with much natural fleshing. He fattened up to where he carried a smooth covering but not too much covering. His full brother was a good steer, and other steers in the Oklahoma A. & M. feed lots that were related to him were quite acceptable.

These steers illustrate the fact that firmness and texture of the flesh can be improved by proper feeding, though natural fleshing is, as we have said, the result of inheritance. Corn is the premier feed for fattening cattle, but too much corn can make hard flesh, or can make soft flesh. Barley may give a little better texture of flesh in our opinion. Royal Jupiter was fed a mixture that included these feeds: Five parts rolled oats, ¾ part rolled barley, 1½ parts wheat bran, ¾ part cooked barley, 1 part corn chop, and 1 part silage or alfalfa leaves. The dry grains were mixed thoroughly. Then the cooked barley sweetened with a little molasses or brown sugar diluted with hot water was added. This mixture was turned at least five times. With this mixture was fed about two pounds of choice alfalfa hay in the morning and the same amount of prairie hay following the evening feed.

Barley and wheat are feeds that can tighten the flesh and hide. Thirty to sixty days previous to market or show time is probably early enough to increase the proportions of barley and wheat. If the tightening process is started too soon, covering may become bumpy or rolly.

These are some of the considerations in the fattening of steers. In order to produce fat cattle that can yield cuts which consumers will buy, the feeder must get unfinished steers of the good natural fleshing type. In order to produce such steers, the breeder must have comparable bulls and females in his herd. Amos Cruickshank of Scotland stated the principle many years ago when he said "Thick-fleshed cattle breed thick-fleshed cattle."

# Teamwork in Jersey Wood Lots

Condensed from Soil Conservation

*Glenn E. Smith**

APPROXIMATELY 40 percent of the saw timber cut in New Jersey in 1948 had been marked for cutting by foresters. No other State has such a record or a complete service for forest owners. There is no secret formula, no magic to account for this success. The reason is simple —cooperation: cooperation between public agencies, State and Federal, in working out a program for the common good.

The New Jersey program started in 1938 when the Bureau of Forest Management in the New Jersey Department of Conservation and Economic Development began organizing a practical system for woods management. Based on sound economics and the use of established forest industries, it has become a complete forestry service for the wood-lot owner who has saw timber to sell. Simply stated, the forester prescribes the silvicultural treatment for any particular woodland by marking the timber to be harvested. Then a private timber agent acts for the owner in carrying out the practices through commercial loggers and getting the largest financial return for the owner.

A few years after this system started, representatives of the Department of Conservation, the Soil Conservation Service, the Forest Service, and the Extension Service of the Department of Agriculture discussed a pooling of efforts in support of the program.

It was agreed that the Extension Service would contribute through information and education, and that the Conservation Department and the Soil Conservation Service would accept joint responsibility for the service aspects of the program. All forestry requests coming to the county agents and extension forester would be forwarded to the Department of Conservation. In turn, the Department agreed to send these requests to the soil conservation districts when they originated in areas where assistance of Soil Conservation Service foresters is available. Requests originating outside districts were to be han-

* NOTE.—The author is forestry specialist, Soil Conservation Service, Woodbury, N. J.

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dled by the Department and the Norris-Doxey farm forester operating from the State office at Trenton. The Department agreed to help the Soil Conservation Service technicians at any farm wood lots where additional assistance is needed.

The Conservation Department agreed to take care of all paper work incident to timber sales and to serve as a clearinghouse for all information pertaining to it. Forest technicians in the Soil Conservation Service were to work only with district cooperators. Requests from noncooperators within a district, who did not intend to become cooperators, would be handled by the Department.

This understanding was put into effect promptly. It began to get results immediately and continues to function smoothly and effectively. Each agency is receiving benefits not otherwise available. For example, the two State foresters assigned to the program and the Extension forester promote interest in soil conservation districts whenever they observe improper use of farm land. The Department forestry research plots and studies are made available to Soil Conservation Service and Extension Service for use at farmers' meetings and for information work. The cooperative management program also has been effective in advancing a common interest in such projects as the annual "show-me" trips to neighboring States for a study of forestry subjects. In the most recent of these expeditions, six different agencies were represented by the nine men who made the trip.

The program harmonized with the normal activities of the cooperating agencies. The Extension Service forester continues to mark trees for cutting in farmers' wood lots and to demonstrate pruning of forest plantations for the benefit of farmers. Practices he uses are those previously agreed upon by all the cooperating agencies. Information and education are principal working tools in Extension Service, but under this program, Soil Conservation Service, the Conservation Department, and Forest Service help in this direction in connection with the common forestry program. It's a smooth arrangement, productive of good results.

The effect of the cooperative spirit has reached far beyond the immediate team. Farmers' requests for forestry assistance are continually being received from Production and Marketing Administration, Veterans' Administration, Federal Land Bank, Farmers Home Administration, and other agencies. Such requests are handled in the same manner as those from the cooperating agencies.

The timber-sale program is not the only enterprise in which the State and Federal agencies cooperate. The Department of Conservation and the Soil Conservation Service have an agreement under which SCS is supplied with tree seedlings for planting worn-out and eroded lands of district cooperators. For wildlife plantings, most shrubs and plants are obtained from SCS nurseries. The Department's Fish and Game Division supplies the soil conservation districts with a large amount of lespedeza and assists in other ways.

As a result of discussions between representatives of the Department, Soil Conservation Service, Forest Service, Extension Service, and the Northeastern Forest Experiment Station, agreements have been reached on planting recommendations for various soil and site conditions. A planting guide, developed for use of all agencies, is the basis on which the sowing schedule at State forest tree nurseries is planned. All of the agencies cooperate in securing proper treatment of plantations after establishment, and are working out uniform recommendations.

In other phases of forestry, the Conservation Department is cooperating with the Northeastern Forest Experiment Station in a program designed to rehabilitate the pine barrens in southern Jersey. This should be the most productive timber region in the State, but it isn't. Actually in 1948 the timber cut there amounted to one-fourteenth cord per acre. This cut-over, burned-over, grazed-over area of desolation is a monument to American land mismanagement.

The Northeastern Forest Experiment Station had the job of making a study and devising methods of rehabilitation. The Department set aside portions of State forest for these studies and experiments. As a result, a long-term program has been developed and application has been started on State forests in the pine region and on privately owned land. It involves prescribed burning as a forest-management tool in pine-oak stands. It is actively supported by the SCS and Extension Service. Because application calls for a knowledge of fire fighting, the Department's Forest Fire Service gives assistance.

The station also is studying problems in the management of Atlantic white cedar, hardwood swamp types, and hybrid yellow pine seedlings. In whatever programs it develops, cooperation of all of the other agencies is assured.

In a few more years, New Jersey will have an over-all forest land-use program that will be a model for the Nation.

# A System Worth Trying

Condensed from the Sheep Breeder

*R. M. Jordan*
South Dakota State College

WHILE the ram is certainly half the flock as far as determining how good your lambs are or how much more they may shear than their dams, they are not the most important part of the sheep business. Too many so-called sheepmen have been forced out of the sheep business because their ewe band was of such poor quality and such low producers that the sheepman went broke before enough good rams had been used to raise the overall productiveness of the flock.

Fall is one of the best times of the year to go into the sheep business. At that season the supply of breeding ewes is the greatest and the price is the lowest. True, the season of greatest feed costs is at hand but the fleece from the right type of ewe will usually pay for her winter feed costs. Since some farmers may be contemplating going back into the sheep business this fall the system outlined here, while certainly not new, may be of help in getting them off on the proper start. This is particularly true for the corn belt farmer.

Kentucky sheepmen follow a system of sheep production that has considerable merit and one that should be practiced in all areas where farm flocks are maintained. In brief, it is as follows: Western crossbred ewes of either Columbia, Corriedale or Suffolk or Hampshire x crossbred type are used. These ewes are bought as yearlings or two year olds from either commission companies or direct from the west. They offer several advantages that native ewes (usually Hampshire, Shropshire, Oxford or Dorset) do not have.

1. They can be purchased for less money.

2. They are free from parasites for the most part.

3. They shear larger and better quality fleeces. The kind of a fleece that will more than pay for the winter feed bill.

4. It is possible to buy large numbers of ewes of uniform type and breeding.

5. They are more productive when crossed with one of the mutton type rams than are the native ewes.

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Chicago, Illinois, September 1949

These crossbred ewes are bred to mutton type rams to produce an early maturing, fast gaining lamb that is in much demand by the packer buyers. Usually no ewe lambs are saved for breeding as they can usually be sold for more as a fat lamb than it takes to replace them with a yearling ewe. When these ewes are five or six years old they are sold and a new band of young ewes is brought in and the process repeated. In Kentucky and several other states where on some farms sheep must provide the bulk of the income, this system has increased the income considerably and has reestablished a profitable enterprise that at one time was tottering, due to unproductive ewe bands.

It is not meant to be implied that a band of native ewes cannot be productive. However, the average western crossbred ewe is usually considerably more productive than the average native ewe. Crossbred ewes and crossbred lambs on the average are about 10 to 15 per cent more productive than straight bred sheep. This is due largely to the greater liveability of the lambs, faster gaining ability of the lamb, and heavier fleeces.

In selecting your ewes, make certain they are sound in bag and mouth. Feel the ewe's udder; it should be soft and pliable with two medium-sized functional teats. While six and seven year old ewes can usually be bought for a fraction of the cost of a yearling, they are often expensive in the long run. Broken mouthed ewes and gummers are usually unprofitable and the last kind of a ewe that a beginner should start with if he wants to avoid disappointment. Big, growthy, heavy shearing crossbred ewes are the type that, when bred to a good mutton type ram, will increase the average sheepman's profits.

It will take some openmindedness and progressiveness in order to change our present system of sheep husbandry in the corn belt area, but a change is long overdue. Why not give it a try?

# New Sprayed-on Fertilizer

Condensed from the Farm Journal

A NEW method of applying nitrogen fertilizer to the *leaves*, not the roots, of growing plants, was announced this month by E. I. du Pont de Nemours & Co. This new method puts the fertilizer to work within 20 minutes.

It may change fertilizer practices for many crops that are sprayed, or that can be sprayed.

It has increased apple yields as much as 30% in tests over several years in New York State. The apples are also redder and of better grade than from trees fertilized at the roots. Bearing wood growth has been stepped up 50%.

The fertilizer material is a high-nitrogen urea compound which dissolves quickly in water. Since it mixes readily with insecticides and fungicides, it can be put on right along with them, without extra time or work. It also can be used in sprinkler irrigation systems. (Phosphorus and potash that the crop needs still have to put through the ground.)

In addition to the boost it has given apples, the material (it's called "Nu-Green") has given good results on peaches, plums, cherries, citrus, potatoes, tomatoes, grass, and ornamental shrubs. Some day it may be used on field crops. So far, however, it is only recommended for apples.

For apple growers the new fertilizer system has many advantages:

1. You can wait until frost danger is past before putting on your fertilizer, and still get its effect when you need it. Putting nitrogen in the ground often forces budding too soon. But when you spray this new fertilizer on, you put on the first of it either with the early pink spray, or the petal fall spray, depending upon the variety of fruit and the amount of nitrogen the trees had last year.

2. You can shut off your trees' nitrogen supply at any time. Trees that get too much nitrogen produce low grade fruit, because the excess fertilizer keeps the apples from turning color at the end of the season. The last application of Nu-Green goes on either with the 10-day spray (10 days after blossom petals fall) or with the first cover spray (20 days after petals fall).

Apple, peach, plum, and cherry trees can take up to 5 pounds of fertilizer per 100 gallons of water without any leaf burn. As much

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Philadelphia, Penna. April, 1949

as 30 pounds per gallon of water have been used on citrus without damage. Potatoes can take up to 20 to 25 pounds per 100 gallons. Five pounds per 100 gallons did no damage to grass and ornamentals.

This year, sales will be limited to apple growing sections of New York and Pennsylvania, where there has been some experience with the material.

The possibilities of spraying fertilizer on apple trees were discovered at the New York Experiment Station by Dr. J. M. Hamilton. He noticed that leaves on urea-sprayed trees became brighter green within a few days.

When Hamilton tested the leaves, he found their nitrogen content had jumped as much as 57% in four to seven days. Further tests showed *the leaves began to make up the nitrogen within 20 minutes of the time it hit.*

A lot of testing will still have to be done on Nu-Green's possibilities. It may be what corn growers need to give their crop a late shot of nitrogen; ways may be found to use it on small grains.

## Digestion

Condensed from The Hereford Journal

*Dr. Woodrow Sharp*

IT ALWAYS has been a puzzle to many cattlemen as to why calves digest whole grains and older cattle do not. It does seem queer that such a phenomenon exists but it is true. The answer is in the developing of the stomach from birth on.

The stomach is compound and consists of four compartments or divisions, and is not four stomachs as sometimes thought. These compartments are designated as rumen (paunch) (1st stomach), the reticulum, second; the omasum (butcher's bible), third, and abomasum the fourth, or true, stomach where digestion takes place.

In the adult cow the rumen occupies about 80 percent of the total capacity; the second about 5 percent, the third about 7 percent and the fourth about 8 percent. The rumen is large and varies in capacity greatly, depending on the age and size of the animal. As a

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Kansas City, Mo. September 1, 1949

rule, in cattle of medium size the capacity is 30 to 40 gallons; in large animals 40 to 60 gallons, and in small animals 25 to 35 gallons. It is essential that the alimentary canal have somewhere in its course a roomy compartment where the bulky, fibrous food can soak and ferment. Since the natural food for a cow is grass and not grain.

All, or most of the cow's food, is regurgitated back from the rumen, and partly from the second stomach, to be chewed, for she does not chew her food as she eats as the horse and hog do. The goat and sheep are the same as the cow in this respect. In order that the cow can regurgitate her food it must be mixed with liquid or a semi-solid or semi-liquid mass. Grass or hay is the only food that will form such masses and therefore is about the only food that is ever really chewed, the rest passing through undigested or partly so. The solid food settles to the bottom of the paunch and never floats on top of the watery mass in the stomach to be regurgitated and chewed. It merely slips out the bottom to the second, third, fourth, and into the intestines without being crushed so that the digestive juices can surround it to aid in digestion. Some of the time it is passed out whole and undigested.

In the calf when it is born the fourth stomach is about 80 percent of the total capacity of the stomach. This is to enable the calf to consume more milk, its sole ration. The calf has no use for the other three, especially the first, or paunch. The first at the start is about 5 percent and the other two have about the same relative proportions as in the adult. As age progresses the first enlarges and the fourth decreases in relative sizes. Due to the fact that the first stomach in the beginning is so small, regardless of what the calf eats every bite is regurgitated back to the mouth and therefore every bite is chewed, digestion of whole grains, and whatnot, thus being accomplished.

As the calf passes from a wholly milk diet to one containing grain and roughage the compartments change in relative sizes at 10 to 12 weeks old, from the 80 percent and 5 percent until the fourth is about half the size of the paunch. At four months of age the rumen or paunch is about four times as large as the fourth. At the age of about a year and a half, the four compartments have reached their permanent relative sizes.

It is between 7 and 9 months that the paunch develops to the point where all the grain cannot be regurgitated to be chewed.

# Why Cows Abort Their Calves

Condensed from the Holstein-Friesian World

*Dr. J. W. Bailey*

WE USUALLY associate Bang's disease with abortions by cows. However, premature calves may be due to other causes, too.

High on the list of abortion causes is the matter of body injuries. These may occur in various ways. We have seen several abortions that followed artificial insemination of cows that were already pregnant. You can't go poking a tube through the seal of a gravid uterus without risking an abortion. Frequent abortions are caused by the kicks of horses when such animals run with the cows. Crowding through narrow gates and doorways, "hooking" and fighting, slipping and falling on ice, and other mishaps are capable of causing abortions.

Many "slipped" calves are caused by injuries suffered at previous calvings. We remember one cow that regularly aborted her calves at about five months. She was finally butchered, and a post portem examination showed that about half the "buttons" or caruncles of her uterus were missing. These were believed to have been lost through bad infection that followed retained afterbirth at the time of her second calving. The remaining "buttons" were able to transmit enough food and oxygen to support a calf up to about five months of age. As the calf continued to grow, the time came when the caruncles could no longer do the job. The calves then died and were later aborted. The "pulling" of calves and other acts may cause uterine infection and damage just as surely as the retaining of afterbirth.

Not so long ago we saw some abortions due to another cause. Many cows in the herd had suffered a bad attack of the new X Disease, and had carried temperatures ranging as high as 108 degrees Fahrenheit. Later abortions were to be expected, for unborn calves can't stand the roasting of high temperatures. Many commoner diseases like shipping fever, mastitis, and pneumonia may carry temperatures high enough to cause abortions.

Bacteria are not necessarily the cause of reproductive diseases that result in abortions. We remember

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a report that described abortions in an Eastern herd as due to a species of mold. Since then various abortions have been associated with yeasts and other types of fungi. Once such a type of infection is established in a herd, it may easily be spread from cow to cow by diseased bulls.

In addition to fungi, tiny single-celled animals known as protozoa can cause abortions. The commonest of these is the one known as Trichomonas fetus which is responsible for trichomoniasis in cattle. This constitutes a true venereal disease and as such is spread almost entirely by the service act.

We once witnessed an abortion by a cow with lump-jaw. The sodium iodide used for treatment of the bad jaw was the direct cause of the mishap. Drugs and "medicines" other than iodides can cause abortions, too. Nitrates, mercury, lead, fluorine, and various others have caused such trouble. Such dangerous poisons are commonly found around farms in the form of fertilizers, sprays, paints, seed treatments, and other compounds.

Strange as it may seem, abortions are all too frequently caused by simple starvation of pregnant cows. A female animal lives first and reproduces as a sort of side line. When there isn't enough food to support both the dam and her calf, the baby is sacrificed. This type of abortion may occur through a shortage of essential minerals even when adequate amounts of food are available. This is demonstrated by the "salt sick" cows of Florida and other sections that suffer from a lack of cobalt, iron or copper. Other deficiencies may also be involved in these so-called "nutritional" abortions.

The severe loss of blood is also capable of causing abortions by cattle. This is not surprising, since the dam's blood carries food and oxygen to the unborn calf and removes dangerous waste products like carbon dioxide. Therefore, a shortage of blood means that a calf many die in short order. Such a loss of blood may follow dehorning, wire cuts, and similar injuries.

A lack of balance between the mysterious hormones may also cause abortions. These are all related and interrelated, so it is generally impossible to say exactly which one has caused trouble. With those influencing growth, reproduction, metabolism, milk secretion, and other functions being so complexly interwoven, it is not surprising that a shortage of oversupply of one hormone can knock all the others out of kilter and result in abortion. Fortunately, such upsets are not too common.

We also have to consider the so-called "lethal" factors that in-

variably kill calves at some stage of their development. These are apt to be dependent on inbreeding that affects only animals carrying certain blood lines. There are more of these factors known in cattle than in any of our other farm animals. A few of the commoner ones are "bulldog head," "doughnut skull," "short spine," "amputated leg," and "hairless." There are probably other lethal factors as yet undiscovered because they do not produce monstrosities in the way of offspring. Recognized or not, these factors are entirely capable of causing abortions.

In recent years we have heard frequent reports of a "virus" abortion in cattle, and there is the possibility of abortion being caused by germs other than those of Bang's disease. We recall a case where several calves had been lost in a certified Bang's-free herd. Repeated tests of aborting cows showed them to be negative. The causative disease was finally determined as being vibronic abortion.

These are the twelve possibilties of abortion in cows. The fun comes in deciding exactly which one is involved in a given herd. We don't recommend that you try to figure things out for yourself if trouble happens to strike in your cow barn. Better get a veterinarian on the job to help size up the situation. A wrong guess on the cause of abortions can cost a lot of money. Better play it safe and get some expert help instead of wishing later that you had.



STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUG. 24, 1912, AND MARCH 3, 1933, AND JULY 2, 1946

of the Farmers Digest, published 11 issues a year at Ambler, Penna. for October 1, 1949
State of Pennsylvania
County of Montgomery
Before me, a Notary Public in and for the State and County aforesaid, personally appeared L. Bush-Brown, who being duly sworn according to law, deposes and says that he is the business manager of the Farmers Digest and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, and July 2, 1946 embodied in section 537, Postal Laws and Regulations, to wit: 1. That the names and addresses of the publisher, editor, managing editor and business manager are: Publisher, L. Bush-Brown, Ambler, Pa.; editor, L. Bush-Brown, Ambler, Pa.; assistant editor, C. Leavitt Dyer, New Hope, Pa.; business manager, A. E. Heick, Ambler, Pa. 3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: none. Signed, L. Bush-Brown, Publisher.

Sworn to and subscribed before me this 13th day of October, 1949. (Seal). James Cassidy, Notary Public. [My commission expires January 7, 1951.]

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**Hunger Signs in Crops**—Published by The American Society of Agronomy and The National Fertilizer Assn. Revised Edition available about November 15th. $4.50.

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## *"NOT BY BREAD ALONE"*

Too many farmers look upon their increased efficiency as a means to greatly expand operations so that they can make more and more money. Some have forgotten that "Man shall not live by bread alone." New tools, more power, greater efficiency, should mean more time to live, greater opportunities for recreation and earlier retirement. Let us use some of these gains in efficiency to provide more time for real living, more time for recreation and vacations, more time for religion and education.

*Charles Shuman, President,*
*Illinois Agricultural Association*

*from N.E. Farm Finance News*